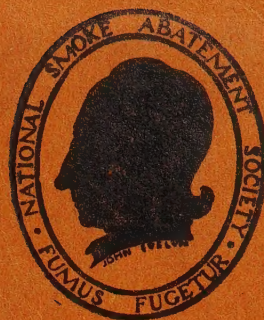


10607

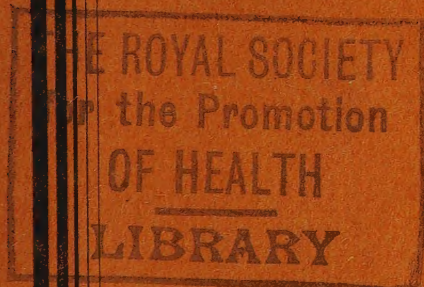
BC
30(d)

NATIONAL

SMOKE ABATEMENT SOCIETY



PROCEEDINGS
of the
CHELTENHAM CONFERENCE
1948



CHANDOS HOUSE
BUCKINGHAM GATE
LONDON S.W.1

pam
WA750
1948
N27p

3/6d.

(d)

THE ROYAL SANITARY INSTITUTE LIBRARY
90, Buckingham Palace Road, London, S.W.I.

Class No.

Acc. No.

This book is returnable **on** or before the last date **Marked** below.

15 MAR 1954



22200102757

NATIONAL SMOKE ABATEMENT SOCIETY

PROCEEDINGS of the CHELTENHAM CONFERENCE

29th SEPTEMBER to 1st OCTOBER
1948

WELLCOME INSTITUTE LIBRARY	
Coll.	welMOMec
Call	pam
No.	WA 750
	1948
	N27p

CHANDOS HOUSE, BUCKINGHAM GATE, LONDON. S.W.1

CONTENTS

PRESIDENTIAL ADDRESS, by Sir George Elliston, M.C., D.L.	3
ADDRESS BY THE MINISTER OF FUEL AND POWER, the Rt. Hon. Hugh Gaitskell, M.P.	6
INTERIM REPORT ON THE NATIONAL SURVEY OF THE SOURCES AND INCIDENCE OF ATMOSPHERIC POLLUTION, by A. J. Cousin, M.INST.F.	13
PROGRESS REPORTS	
Introductory Review, by Arnold Marsh, M.SC.TECH., M.INST.F. ...	21
The Coventry Corporation Bill	24
Carrington Power Station	26
Developments at Walsall	27
Prior Approval in Birmingham	29
— — in Sheffield and District	30
— — in Leeds	31
The Testing of Domestic Fuel Burning Appliances	32
Smoke Prevention Device for Industrial Boilers	33
Bristol Smoke Control Committee	34
Dust Nuisance from Cement Works, Thames-side Area	35
Central and District Heating Schemes	36
Progress in Salford	37
JOINT DISCUSSION ON THE SURVEY AND THE PROGRESS REPORTS	38
SMOKE ABOLITION AND THE PUBLIC: PROBLEMS OF EDUCATION AND PROPAGANDA, by Leslie Hardern	46
DISCUSSION ON MR. HARDERN'S PAPER	50
SMOKE PREVENTION AND TOWN PLANNING, by J. Nelson Meredith, F.R.I.B.A. ...	52
DISCUSSION ON MR. MEREDITH'S PAPER	58
BRAINS TRUST REPORT	61
RESOLUTIONS	65

The Conference was opened on September 29th by His Worship the Mayor of Cheltenham, Councillor H. T. Bush, J.P. The Sessional Chairmen were the retiring President, Sir George Elliston, M.C., D.L., Mr. D. L. Lipson, M.A., Member of Parliament for Cheltenham, and Alderman Clara Winterbotham, J.P., Deputy Mayor of Cheltenham.

PRESIDENTIAL ADDRESS

By SIR GEORGE ELLISTON, M.C., M.A., D.L.

DURING the war the Society naturally had a rather lean time, but it kept itself together, and by quiet discussion and study laid the foundations for the new policies for smoke prevention that are now finding their way into Government reports and on to the statute book. Towards the end of the war it became clear that so much had to be done during these post-war years, and so much more interest began to be taken in the Society, that a brand new constitution became necessary. This came into force in 1946, and has been most successful, both in helping to improve our financial position—which was vitally urgent—and in ensuring a stronger and more representative Executive Council.

I had the pleasure of becoming the first President to be elected under the new rules, one of which, however, lays it down that one cannot remain in that office for more than two years. So, to my own personal regret, this address must be the last I shall be able to make to you from the Presidential Chair. But it is a privilege to make way for Lord Simon of Wythenshawe, who has for so long been so closely associated with our movement. Although you will all know him for his great work on housing and as Chairman of the Committee that published the Domestic Fuel Policy report, to which I shall refer again, perhaps not so many will be aware that he was the first honorary secretary of one of the Society's parent bodies, the Smoke Abatement League of Great Britain, and author with Miss Marion FitzGerald, of the book published soon after the first world war, "The Smokeless City."

My term of office has been a most

happy one, not only because I have enjoyed the close association with you all at conferences and meetings of the Council and its committees, but because the last two years—or more precisely, two and a half years—have seen some of the most important advances yet made towards the ending of the smoke evil, and certainly the most satisfactory growth of the Society's own position and standing. The whole picture of the smoke abatement situation has changed radically during the thirty months I have been your President.

When I say that we have made important advances towards the ending of the smoke evil I do not of course imply that we have seen any substantial improvement in the present conditions of the atmosphere. That would not be true, and for many reasons we are forced to try to be patient in waiting for to enjoy the fruits of our labours. Although the fruit is not ripe, the tree is at last strong and healthy, with firm spreading roots; it is in good leaf and there is a vigorous growth of flower buds.

I do not intend to attempt any account of all that has happened during this time, and will refer only to one or two of the more significant matters. Foremost of all, perhaps, is the report on Domestic Fuel Policy of an advisory committee of the Ministry of Fuel and Power, under the chairmanship of our incoming President, Lord Simon of Wythenshawe. Although the report necessarily covers a wider field than smoke prevention it shows unmistakably how the whole problem of the domestic uses of fuel, both from the viewpoints of national policy and of the householder, is firmly and inextricably

bound up with the policy of abolishing smoke from our homes. It recommends a policy that will lead step by step to this objective, and it is most gratifying that this policy should be so very similar to that of the Society.

Of course, reports can be presented to Ministers and Governments, but it does not always follow that they are acted upon. Indeed, in our own field, it may be recalled that one of the criticisms of the Newton Committee in 1921 was that "no government has, for many years, taken any action with the exception of appointing committees, whose labours have had little or no result."

However, it was soon stated in Parliament that the Government did, in general, accept the recommendations of the Simon Committee, and there have been many signs since then that, despite all the difficulties and frustrations of the times, it is firmly intended to proceed with the plans proposed.

And I think I may say that one of the most real, and certainly one of the most pleasurable of these signs is the presence with us at this conference to-day of the Minister of Fuel and Power himself. I do not know what he is going to say to us about these plans, but I am quite sure he is not going to disappoint us, cautious and discreet though Ministers of Fuel and Power must always be.

During these two and a half years we have also seen action based on policies advocated by the Society. We have seen new measures for preventing smoke approved by Parliament and placed on the statute book. True, they are so far only local Acts, but they embody new principles and are most significant. There was first the new Act of my own Authority, the City of London, which for the first time in this country gives powers for the prior approval of new fuel-burning installations. Similar, though not identical, powers were then secured by Manchester, which also made history by having our own scheme for smokeless zones included in its Act. Other towns have followed and more are likely to come—and it is all leading up towards the new general legislation we now

need.

I may turn for a moment to the Society's own progress during these first years of its new régime. Over a hundred new local authorities have joined it as members during that time, and it has now affiliated to it practically every large town in the country, as well as many of the smaller ones—representing well over one-half of the total population. Its income is still lamentably small for the size of the task it is so zealously tackling, but it is comforting to note that its subscription income has risen from £1,300 in 1944 to £3,400 in 1948. But compare this slender sum with the figures of what we really need given in the paper by Mr. Hardern to be discussed to-morrow, which you have no doubt already carefully studied. What is happening is that the Society is doing rather more than it can really manage or afford, and that everyone is expecting it to do a great deal more. It wants to do more, of course; a great deal more; but at the moment it is painfully embarrassed as a direct result of the success of what it has already done.

There are now three divisional organizations of the Society, all active and making good progress, and soon there will be more. We have excellent friendly liaison with the Regional Committees of the local authorities, and it is a sign of our maturity and of the responsible position we have achieved that our relations with Government departments, and with scientific and technical bodies, and of course with our own local authority members, should be closer and firmer and more productive of useful co-operation than ever before.

We must of course always recognize that we have still a long way to go, and that the road will not be an easy one, before our objective is gained and we can sit back and relax—or disband. But at the same time we must remember that we are moving quite steadily along the road, and that although the pace is still too slow it is quickening.

We must not, however, lose sight of the most serious factor of all that concerns us, which has continued

without cessation during the two and a half years of my Presidency—the waste and damage due to smoke that has gone on, and the enormous loss of coal involved in the production of this smoke. This yearly loss of fuel, our D.S.I.R. friends estimate, is equivalent to 2½ million tons of coal, and to it must be added the greater loss contained in the invisible gases formed with smoke. From the fuel economy point of view smoke is like an iceberg—the more serious part cannot be seen. As we were told at Edinburgh last year, these losses may be several times greater than the loss of visible smoke, so that there is a total loss equivalent to about 10 million tons of coal a year. If this estimate is correct, during my term of office some 25 million tons of precious fuel have been mined at great cost, transported at more cost—and then thrown away. How excellent it would be if we could recover it and present it to the Minister!

I cannot close this Address without paying tribute to two of the outstanding workers for our movement. First of these is Mr. Charles Gandy, who presides over the Council with so much tact and sound judgment. For years we have had the benefit of his leadership and he has never stinted the valuable time he has spent in our service. His patience and charm of manner make it very pleasant to submit to his rulings even when there is a clash of opinion in our discussions. Secondly, I am sure I may express on your behalf our gratitude to Mr. Arnold Marsh for his devoted service to the Society. He

not only conducts our daily affairs with unfailing efficiency, but as Editor of *Smokeless Air* he has done much to educate public opinion on the problems of smoke abatement. In addition we rely on him as skilful liaison officer between the Society, Government departments, municipal authorities, and industrial organizations. Above all, we are grateful to him for his authorship of “Smoke: the Problem of Coal and the Atmosphere,” which is likely to remain as the authoritative textbook of our movement for many years to come.

In conclusion, as one who has many interests in the fields of public health and the prevention of disease, I should like to direct your attention to the words of the Medical Officer of Health for the West Riding of Yorkshire, Dr. Brockington, who in a recent report pointed out, in an admirably direct fashion, that “it is a contradiction of the principles of positive health when the air that people breathe contains dust and soot capable of causing solid deposits to the amount of upwards of 150 tons per square mile each year,” and even more firmly added: “it is the negation of preventive medicine to establish hospitals a large proportion of whose beds would be redundant in a clear atmosphere.”

That surely is the very heart of our case for the abolition of smoke, and I do ask you all to consider and appreciate its significance and to bring it home to your own authorities as strongly and as persistently as you possibly can.

ADDRESS

by

The Rt. Hon. HUGH GAITSKELL, M.P.

Minister of Fuel and Power

THE Society made a particularly wise decision in my view when they chose Cheltenham as the place at which to hold this Conference. For I have always regarded Cheltenham as one of the cleanest cities in the country. My memories of it go back a long time, so long indeed that they are now clouded. But through the clouds stands out the picture of very white buildings standing on each side of broad streets. Perhaps for this reason too it has always seemed to me a town with a peculiarly continental flavour, though whether the residents prefer stoves to open fires I cannot say. It is a pleasure to me to come back here because of my family associations with it. My grandfather, who was born two years before the battle of Waterloo, lived, I believe, for the last half of his life here. My father and his brothers were all educated here; aunts and cousins and even my own family were for a short time citizens of this town.

Mr. President, you have told us of the progress made by the Society in the past two years. I congratulate you on having held office in a period of substantial advance during which reconstruction has taken place, membership increased and the whole activities of the Society have been enlarged. Of these activities I would refer particularly to the extraordinarily interesting survey by Mr. Cousin on the sources and incidence of atmospheric pollution. This seems to me objective, constructive and adorned with a very pleasant, dry humour. I shall touch later on one or two of the points made by Mr. Cousin.

I should also like to express my pleasure at the election of Lord Simon of Wythenshawe as your new President. He and I are old friends. Of course, he is peculiarly well suited to occupy this position, partly because of his earlier work on smoke abatement but still more because of his work as Chairman of the Committee on Domestic Fuel Policy. Perhaps one might add that it seems exceptionally appropriate that the Chairman of a Society whose aim is to purify the atmosphere of smoke and soot should be a man who, as Chairman of the B.B.C. is also concerned that the ether should not be contaminated in other ways.

There are, I think, two main arguments in favour of what is called smoke abatement. There is the economist's argument and there is the technician's argument. The latter is one which particularly concerns me as Minister of Fuel. For it is part of my statutory duties "to promote economy and efficiency in the use of all forms of fuel and power" and it so happens that fuel efficiency and smoke abatement go hand in hand most of the way. To this subject I shall return later but I want, first of all, to refer to what I have called the economist's argument. Perhaps I may claim a right to do so since long, long ago I used to make my living teaching economics.

The economist's case is this. When a factory or private house pours out smoke it proceeds to defile and obscure the atmosphere, to discharge grit upon its own and other people's premises

and to create dirt and corrosion. This process imposes costs upon the rest of the community which the person who actually owns the factory or the house does not have to pay. Because he does not have to pay them, these costs are not taken into account when the decisions what fuel to burn, what appliance to instal and therefore possibly what articles to produce, are taken. The result, says the economist, is that wrong decisions from the point of view of the community are taken. If these additional costs had really been counted in as they should have been, you would get a result which more accurately reflected the wants of society. Perhaps I can elaborate this by some illustrations. Not long ago I visited a brewery and one of the things which most impressed me was the extraordinary amount of trouble taken to keep the place spotlessly clean—almost everybody seemed to be engaged on cleaning. One might even say there was water, water everywhere, except that it would be a little unfair to the brewery! The Manager who showed me round told me that, in fact, about half their labour costs were incurred through the necessity of keeping everything perfectly clean. Now these costs were, of course, paid by the brewery and passed on to the consumer in the price of the beer. They were attached—as it were—to the article in the production of which they had arisen.

It so happens that that brewery also had a very efficient heating system. I may say that they used, apart from the anthracite they required for malting, 90 per cent. opencast coal and yet had a very high fuel efficiency. Nor did I see any signs of smoke pouring out of the chimneys. But to judge by Mr. Cousin's report this is not always the case. The brewery might have had a very inefficient system. It might have been pouring out smoke and in so doing adding heavily to other people's costs, causing them to spend additional money in painting their buildings, washing their linen, and cleaning their equipment. But the brewery does not have to pay for this. There is, in other words, a social cost which is paid for by

the whole community, while no bill is sent in to the real sinners, who therefore continue in their sin with impunity. I see that among the worst offenders there are said to be a number of laundries. From the strictly economic point of view of their own interests I suppose there may be something to be said for it but certainly not from the point of view of the rest of the community. Some of the collieries themselves are, undoubtedly also sinners in this respect. Somebody wrote me a letter the other day drawing my attention to this—which was hardly necessary because I have to travel fairly regularly through the coalfields and know what they look like—but he asked "in your address to the Smoke Abatement Society I am not sure whether you intend to take the part of Satan rebuking sin or in praising the efforts of your colliery experts." Well I think the metaphor is a little mixed because for this purpose at any rate I prefer to regard myself as more like the Archangel Gabriel. It is, of course, true that the collieries do frequently have to make use of their inferior fuel, more inferior even than they supply to other people. Nevertheless, we certainly should not be satisfied without making sure that more efficient methods of firing can produce an improvement, and it is hardly possible to applaud the very reasonable conclusions of Mr. Cousin that "the plea of inferior fuel is rather over-done and is likely to be used as an excuse for inefficiency for some time to come," and then to go and exempt collieries from criticism on the grounds that they have to burn a lot of muck.

So much for industrial smoke. The economist's argument on domestic smoke is much the same. When you burn coal in an open fire with peculiar inefficiency at home you may not be running a business, but the damage that you do to other people is just the same. Your habits may involve you in heavy expenditure which, nevertheless, for the sake of the pleasure you obtain you are willing to incur, but this is no justification for imposing costs upon other people when you do not have to meet

the bill yourself. I once had some friends who were very fond of cats and these cats had a habit of sharpening their claws on the sofa and chair covers, so that the covers had constantly to be renewed at considerable expense. This was all right. It was part of the cost of keeping the cats, just like the cost of feeding them, and it was paid for by my friends, but when you pour smoke out on other people's linen it is a different story!

And apart from the more obvious incidence there is the imponderable element, the loss of sunlight which, heaven knows, in this country is in sufficient short supply—to use the current jargon—with the consequent effect on health both physical and psychological to which, Mr. President, you have referred.

All this, the economist argues, leads to the conclusion that, in principle, here is a case—which even the most rigid laissez-faire die-hard could not demolish—for intervention by society, for action by the community, so as at least to impose upon those who are responsible for creating the social costs the responsibility for meeting them.

Before, however, turning to the question of action I would like to say a few words about the technician's approach to the problem.

It might have been the case that the pollution of the atmosphere by smoke was something which could only be stopped at great expense to the community. The hypothetical brewery to which I have referred—the one with the bad combustion arrangements (not the one I visited)—might have found that the expense of eliminating smoke was so great that it really preferred to pay other people for the damage caused by the smoke and continue to allow it to be emitted. But, of course, the extraordinary thing is that to stop a chimney from smoking, far from involving the individual in more expense, will, in a great many cases, actually save him money because, as you all know, smoking chimneys, particularly in industry, are often a sign of bad fuel practice. They mean that

the coal is being burnt in a manner which fails to provide the maximum degree of heat.

As you will no doubt appreciate, I was somewhat embarrassed a few months ago by a certain poster which the Government issued in connection with the production drive. I am glad to say that it has now been withdrawn in favour of a much better one, but the fact that such a poster could have been issued does illustrate, I am afraid, the extraordinary ignorance which prevails on this subject. The only defence which could be put up in its favour was that people associated full production with smoking chimneys! How vividly that illustrates the great amount of educational work which still remains to be done in the field of fuel efficiency.

I think, however, we can claim that there has been most remarkable progress in the past few years. As the President has told us the Newton Committee of 1921 was rather caustic on the attitude of Governments to this problem. But even in 1945 I must remind you that Dr. Dobson, the Chairman of the Atmospheric Pollution Research Committee, stated that, as a result of the first year's work of the Fuel Efficiency Campaign alone, there was a reduction in pollution of 11 per cent. throughout the country, in comparison with the previous year. Since then, of course, the work has continued and every year our Fuel Engineers, and those who are good enough to help us in this work in a voluntary capacity, visit something like 20,000 industrial establishments a year, to advise on greater efficiency; and I have no doubt that, despite the fact that, for various reasons, there has had to be a good deal of down-grading in so far as the fuel itself is concerned, the progress mentioned by Dr. Dobson has been continued.

During the war, of course, and even now, we are limited in our efforts to improve fuel efficiency and reduce the smoke nuisance by the difficulty in getting new boiler plant. Even in this case we cannot ignore or be free from the impact of our balance of payments problem and the tremendous arrears in capital equipment in this country

which still have to be made up. And although as time goes on one hopes that capital expenditure of this kind will become easier we must, for the time being, rely rather on improvements in current firing practice. I should like to emphasize that the country now possesses in our Regional offices a force of trained stoker demonstrators, prepared to visit any combustion plant and help the operators by practical demonstrations to use their coal more efficiently and, therefore, produce less smoke. I was glad to see the reference in Mr. Cousin's report to this part of the Ministry's activities. I agree with him, however, that there are still many authorities who do not make sufficient use of our technical services.

There is another long-term project referred to by Mr. Cousin: the educational work of the Ministry in conjunction with Technical Colleges. For the first time courses for the average fireman have been arranged and, as a result, he can obtain a certificate of practical competency on a syllabus approved by the City and Guilds, London. I believe this development will be especially welcome to the National Smoke Abatement Society because it really represents an expansion, through the country, of the courses which you initiated at Glasgow and Manchester and other large towns before the war.

These new courses in boiler house practice were started in the winter of 1946. 600 students have attended lectures at 32 centres and 323 were successful in the examination. In the winter of 1947, 1171 students attended 58 courses and 712 were successful. I am bound to say the figures still seem to me far too low, but I am glad to see they are going up. I hope the Society and everybody here will do everything they can to encourage those concerned to attend these valuable courses. Before I leave the subject of industrial fuel efficiency, I must refer to a recent very dramatic example. At the moment in Berlin three members of the Ministry's staff are engaged in tuning up the power stations in the British sector and

it is believed that their work will help to produce savings of up to 150 tons of coal a day that would otherwise have to be flown in by air this winter requiring about 15 planes a day.

Now let me turn to the domestic problem. This is undoubtedly more difficult—both technically, politically and psychologically. You have the fact that people like an open fire. The time may come when we are indifferent to it but it has not yet arrived. You have the fact too that the vast majority of our houses, being built some time ago, have old-fashioned grates fitted in them, which are not calculated to give the most efficient performance. Progress, therefore, must inevitably be slower in this field but although we may be impatient sometimes it must be emphatically asserted that there has been a considerable advance. Let me take the case of the new houses. We were faced immediately after the war with this position. We at the Ministry wanted the most modern appliances to be installed in these houses but the decision in such matters, of course, rests with the local authorities. We found that the local authorities were often inclined to say "we cannot get the modern appliances" and, at the same time, the manufacturers were inclined to say "we will not manufacture modern appliances because there is no demand for them." Well, by steady patient persuasive work we have now got to the stage where the manufacturers have switched over sufficiently from the old to the new models, with a result that they are producing enough to supply new appliances for all the new houses now being built. This may not sound very impressive, but when you remember that in many cases, apart from the designing, there has had to be complete new tooling-up by manufacturers, I don't think the outcome is too bad. Some people, no doubt, think that we should have used compulsion. The local authorities should, they say, have been prohibited from putting in anything but modern appliances in these houses while the manufacturers should have been prohibited altogether from producing the older

types. Apart from the fact that when the housing programme started, this was not possible because production of the improved types was not sufficient to meet requirements, for my part, I would much prefer to proceed, as far as possible, by the method of persuasion rather than compulsion. After all, people have very individual views on fires and boilers, and I do not think that it would be conducive to the success of our educational campaign if we were to force the issue at this stage. At the same time, I cannot for one moment pretend that I am really satisfied. A sample survey which we carried out, covering about 120 thousand houses built since the war, shows that only 1 in 3 have been fitted with this new equipment. I have already explained the difficulties in obtaining the new equipment sufficiently quickly but, even allowing for this, that progress is not enough. I do, therefore, urge those of you who are connected with local authorities, either as councillors or officials, to do everything you can to ensure that in the houses you build the most modern appliances are installed. I may say that some of the local authorities whose Medical Officers of Health have been pressing us for increased efforts, are the very ones who have been most backward in this matter! To me at least it seems quite incomprehensible that there should be any hesitation on the part of local authorities to incur an additional expense of, say, £10 on a house that costs perhaps £1,500, which is going to have a life of, say, 50 years, when as a result you could obtain, perhaps, twice as much comfort or use half as much fuel. The small additional cost is going to be saved over and over again and, of course, from your particular angle, there will be at any rate *less* smoke nuisance than would have otherwise been the case.

You will expect me to say something about the prospects of obtaining smokeless fuel because it is evident that the domestic smoke problem would be solved if it was feasible, and was the custom for nothing but smokeless fuel to be burnt in people's homes.

The supply of coke, of course, is related to the production of gas. Just at the moment coke supplies are easier, partly because of increased gas production and partly because in order to save gas-oil the undertakings have had to cut down their production of carburetted water gas and increase the throughput of ordinary coal gas. I must point out, however, that we are now pretty well up against the limit of plant capacity for making coal gas and to meet the peak demand this winter there will probably have to be additional production of carburetted water gas which, of course, means using more coke in the gas works. However, looking further ahead, the supply of coke will no doubt continue to increase broadly in proportion to the increase in gas consumption, that is, by about five per cent. per annum.

The Simon Report, of course, laid great emphasis on anthracite production. I am afraid the immediate position is not encouraging. On the contrary the value of anthracite as an export is so great that we are having to ask consumers, particularly those using certain grades, to substitute coke for anthracite wherever they can. Moreover, of all the problems facing the National Coal Board that of the production of anthracite is, perhaps, the most difficult. It is being mined at present at a heavy loss; the experts, I believe, take the view that only the complete re-equipment of the coal-fields, involving heavy capital expenditure, can lead to the increased production and reduced costs which we all desire. The Coal Board are examining very carefully, as they must do, this whole question of long-term development, but as yet no definite decision has been reached.

One must, therefore, conclude that for the time being, we must expect bituminous coal to continue to be burnt in people's homes.

You may say, of course, "why not make them use gas and electricity?" Well, in the first place, I happen to be a strong believer in leaving consumers freedom of choice. It may well be that because gas and electricity is more

labour saving than solid fuel, there will be a continued tendency for replacements of this kind to go on. But there is a further difficulty and that is that in the case of electricity, and to almost the same extent in gas, shortage of plant is a great handicap. I cannot possibly encourage the use of more and more domestic electricity when we have not got the power stations to generate it and when additional burdens can only increase the need for loadspreading and the danger of serious interference in industrial production through load shedding.

I do not wish, of course, to deny that, from the point of view of efficiency and of smokeless combustion, the open fire is a most unsatisfactory proposition. We are now in co-operation with a number of leading local authorities testing the balance between increased efficiency and convenience which other systems can provide as against the traditional feeling in favour of the open fire. They are now building in eight centres, houses demonstrating four different systems of house heating, including one using bituminous coal. It will be extremely valuable to find out what the tenants think about these systems, while at the same time the Building Research Station is carrying out scientific experiments to measure the thermal efficiency of the appliances.

Finally, there is another possible solution in district heating. The mission to the United States last year, whose report will very shortly be published, found that by far the majority of local housing authorities over there rely on some form of district heating on their estates. Of course, again tradition comes in. Central heating is accepted in the United States far more than it is here. It is worth noting that this preference is not the result of climatic differences, since some of the places where district heating is the rule have weather almost identical with ours. I am glad myself that a number of local authorities are now starting experiments in district heating over here on their new estates. We shall look forward with interest to the results which they report.

The other day Sir Ernest Smith, so I read in the papers, called for a comprehensive national fuel policy and said that under such a policy all available fuels could be considered and guidance or direction could be given. He went on, somewhat to my surprise, to say "this matter was raised by the Institute of Fuel officially some time ago and the answer was that the Ministry of Fuel and Power had at its inception adopted the principle of devising a national fuel policy—we are still waiting for it."

I say somewhat to my surprise because I thought that I had dealt fairly fully with this subject in the speech I made on the Second Reading Debate on the Gas Bill, and I happen to know that Sir Ernest Smith was sitting in the Gallery. I can only assume, with regret, that he was so bored with the earlier part of my speech that he fell fast asleep before the end! I do not wish to recapitulate now what I said on that occasion but I would just say this: if by a national fuel policy Sir Ernest means that we at the Ministry ought to tell people exactly what fuels they are to use, then I am afraid he is going to be disappointed for it would be contrary to the principle that consumers must have freedom of choice. Some people like electricity for cooking, some people like gas, some people like gas fires, other people like an open fire, some people like central heating, other people detest it. We must really allow individual preferences to have some weight in this matter. Nor must we make the mistake of assuming that fuel efficiency in the technical sense is everything. It is not. Costs must also be taken into account. What we aim at securing is the highest degree of fuel efficiency commensurate with the capital costs involved. Comparative costs are, after all, a pretty sound criterion and I think we should do well to allow them to exert their influence.

Of course, the whole position at the moment is still affected by shortages of one kind or another. Coal and oil are both scarce and their distribution has to be controlled. Special action has to be taken to reduce the peak load on the

power stations. Lack of steel certainly holds up development in the gas industry too. The result is that we have to give a good deal of guidance and even direction which in all amounts, if you like, to a short period fuel policy—though I do not think this was what Sir Ernest had in mind.

What is wanted in the long run is not merely that consumers should be free to choose but that they should have a chance of choosing wisely. In other words we must see to it that full, accurate, and unbiased information is available. We must also see that the prices which influence their choice reflect accurately the real cost of producing, distributing and installing both the appliances and the fuel.

And this brings me back to smoke abatement. For here we have a case where, alas, there is far too much darkness of mind, where ignorance must be dispelled in the interests of consumers themselves, where too, as I have argued, heavy social costs arise which are not and perhaps never can be

reflected in individual prices. And this means that as I intended to convey in the speech to which I have referred, it must inevitably be a part of our fuel policy to tackle this problem of smoke pollution. Having said that, let us not jump to the conclusion that we should impose a lot more rules on people from the centre or go in for too much regimentation. The reports presented to this Conference show that already much progress is being made, both by way of education and through local government. It may be that more positive steps still should soon be adopted and I shall be happy to discuss them with your representatives. But whatever the outcome may be I am sure that we must continue to rely on the efforts of your Society and its members who have already done so much to assist the cause of fuel efficiency and whose success not only leads to a saving of our valuable coal but helps to remove from the atmosphere the poisonous mass of soot and dirt which has for so long disfigured our towns and blocked the sunlight from us.

INTERIM REPORT

On

National Survey of the Sources and Incidence of Atmospheric Pollution

By A. J. COUSIN, M.Inst.F.

1. General

At the Annual Conference of the National Smoke Abatement Society in October, 1947, at which 450 representatives of local authorities were present, the following resolution was passed :

“That the Executive Council be requested to take the necessary steps to undertake a nation-wide survey of the sources and incidence of atmospheric pollution, and that local authorities be urged to co-operate with this object in view.”

1.1. The Executive Council decided to proceed by addressing to every local authority a questionnaire in two parts, general and detailed, on two forms, green and yellow respectively, with which many will be familiar.

1.2. It was with some diffidence that the Executive Council adopted this course in that it laid an additional burden upon overworked staffs pre-occupied with their statutory duties. Moreover, the Society, being a voluntary body, had no authority to call for a return of this character, and the value of the Survey would depend entirely on the extent to which Local Authorities and their officers would be prepared to co-operate. A further difficulty would be likely to arise from the impossibility of establishing any common standard of assessment of atmospheric pollution, unless its measurement were undertaken by scientific methods.

2. The questionnaire was addressed to the following bodies in England and

Wales and in Scotland, and replies were received from the number indicated in the second column.

	<i>Sent to</i>	<i>Replies Received</i>
<i>England and Wales</i>		
London County Council, City of London and Metropolitan Boroughs	30	22
County Boroughs	83	66
Municipal Boroughs	309	169
Urban Districts	572	261
Rural Districts	475	170
	1,469	688
<i>Scotland</i>		
County Councils	34	12
Royal, Parliamentary and Police Boroughs	195	61
	229	72

2.1. Of the 198 local authorities represented at the Edinburgh Conference, who supported the resolution, 149 have sent in returns.

3. Immunity from Atmospheric Pollution

Of the authorities that have made returns, some 140 in England and Wales and 15 in Scotland have reported they suffer from no atmospheric pollution.

3.1. Such a conclusion arrived at by such a large number of local authorities gives cause for thought, particularly in the light of evidence that has been adduced hitherto.

3.2. At the Conference in Edinburgh last year it will be remembered, Lord

Sempill referred to an incident when his plane was parked in the open in Cornwall throughout the night, during which a slight rain fell. In the morning the plane was covered with a coating of soot, carried by the wind from the Midlands.

3.3. Mr. Entwistle of the staff of the Meteorological Office of the Air Ministry reported the difficulties attributed to smoke experienced by pilots flying over Great Britain or from Britain to the continent. Banks of smoke are frequently found at great distances from the area in which they were produced.

3.4 The late Sir Frank Baines reported on many occasions on the damage by the corrosive action of atmospheric acid to stonework of historic Abbeys in Yorkshire and in the Wye Valley far removed from any source of smoke.

3.5. In the survey under discussion, one island off the West Coast of Scotland reported that, with the wind in a certain direction, it suffered from heavy deposits of soot from a distant industrial area.

3.6. In view of the extensive evidence of the widespread dispersion of smoke and acid in the atmosphere over Great Britain, and the universality of domestic smoke, these professions of complete immunity may give rise to some pardonable scepticism.

4. Standard of Assessment

The absence of a common standard of assessment of atmospheric pollution offers a major difficulty. Where a local authority is sufficiently interested to tackle the problem scientifically and install solid and sulphur dioxide gauges, the way is clear; but where the authority relies on the unaided impressions of its officers, very wide differences in outlook are apparent.

4.1. It is well-established that domestic chimneys are responsible for at least half of the general atmospheric pollution in Great Britain. However, unless an individual is made smoke conscious by seeing smoke issuing from chimneys resembling those with which the Central Office of Information covered

our hoardings, he seems to be unconscious of the equal or greater amount of smoke issuing from the thousands of house chimneys in his area. This attitude of mind is illustrated by the tone of several of the replies in respect of areas alleged to be immune, which are quoted below :

	<i>Population</i>
<i>Rural Districts</i>	
"We have no large industrial plants to pollute air"	12,000
"No smoke-producing industries"	7,400
"No industrial premises of any size"	17,000
<i>Urban Districts</i>	
"Small coastal resort with no industries"	12,000
"There are no industrial premises in the area"	3,000
<i>Boroughs</i>	
"Non-industrial area"	24,000
"Very few industrial plants within the borough"	64,000
"Negligible owing to there being no factories"	26,000

This last town lies in a deep depression in which, in calm weather, a heavy pall of domestic smoke can be seen.

4.2. One country borough reported that it suffered from no atmospheric pollution and no useful purpose would be served by filling up the forms. Ironically enough, a photograph of this particular town was published some time ago to show a heavy pall of smoke hanging over the town. On a second approach however, the authority sent in a very comprehensive return.

4.3. Equally surprisingly, a metropolitan borough reported: "This is largely a residential area, and as such has no real problem of atmospheric pollution . . . has experienced no trouble from such pollution drifting from other areas."

The mean deposition in the area is somewhat higher than that at any of the deposit gauge stations in Newcastle-on-Tyne.

4.4. An Urban District some twenty miles from London reported: "... is predominantly residential and fortu-

nately it has no atmospheric pollution in any way."

The above quotation from reports from areas alleging complete freedom from atmospheric pollution are illuminating. Reports from areas heavily industrialized rarely fail to mention the presence of domestic smoke, whereas even densely populated areas frequently fail to mention smoke from domestic chimneys, but confine their remarks to public buildings, laundries and so forth.

4.5. There are, however, noteworthy exceptions as several mainly residential areas have reported that they suffer from domestic smoke only.

5. Nature of Replies by Local Authorities

Another outstanding difference is the manner in which forms have been filled up. Those from some local authorities have been completed with meticulous care, others have been dismissed very summarily, and in a few cases officers omitted to fill in the name of their local authorities.

5.1. One local authority submitted a summary of deposits in different parts of the town during working days and holidays in summer and winter, from which it was possible to deduce that over 50 per cent. of the smoke was due to that emitted from house chimneys. Comparative sulphur dioxide records indicate that over a half was produced by domestic grates, and that this was much heavier in parts of the town where old houses were still fitted with old-fashioned grates. Ultra-violet ray meters showed that the town got approximately one-third of the light that reached the immediate rural areas.

5.2. Another local authority provided a large scale map showing lines of equal solid deposition. This showed the heaviest deposition in the neighbourhood of heavy industry and in the old part of the town where houses were still heated by old-fashioned grates.

5.3. Another authority made the survey the occasion of a visit to all the steam-raising plants in their area and

in this they have had the willing co-operation of the firms concerned. They have given a very comprehensive return showing the cause of heavy smoke production. In one instance opencast slack was being fed to an underfeed stoker, which promptly became choked. A low-pressure Lancashire boiler was being fired with rubber waste which could not otherwise be disposed of, while a locomotive type boiler fired with wood waste was the cause of heavy pollution.

5.4. It is gratifying to note that a number of local authorities are establishing air pollution stations with deposit gauges and sulphur recorders, in their areas.

One Authority has drawn up a special clause for inclusion in leases in connection with land under their control and used for industrial development, and laid down that all houses under their control shall be fitted with grates for smokeless fuel.

5.5. For these comprehensive reports and for many others prepared with great care and contributing much useful information, and for many supplementary reports that have been submitted, the Society offers its sincerest thanks to the local authorities responsible, and hopes that local authorities, whether they have contributed or not, and whether or not they are members of the Society, will be able to utilize the results of the survey in overcoming the atmospheric pollution in their own areas.

5.6. Having outlined the difficulties and drawbacks involved in the completion of the survey, the reservations that will have to be applied in interpreting the result will be apparent.

6. Smoke attributable to low-grade fuel

Where smoke is reported, its production is frequently attributed to inferior fuel. This applies to some 50 per cent. of the returns, and it occurs with such regularity that it requires careful consideration.

6.1. Some inspectors simply record the fact that the smoke produced is

stated to be due to inferior fuel, and were it generally true, the only conclusion that could be arrived at would be that all coal deliveries had been degraded.

6.2. When one remembers how easy it is, even with the best of fuel such as a dry Welsh steam coal, to produce large volumes of smoke by taking the appropriate measures, one is inclined to enquire whether the production of smoke in many instances is not due to causes other than poor quality of fuel. Some authorities record that plant has been converted to oil-firing but in some instances it is noted significantly that the conversion has not been accompanied by any reduction in the smoke emitted.

6.3. A number of inspectors are of the opinion that inferior fuel is not the sole cause of smoke and add that the boiler plant in question is obsolete and overloaded. In other instances, necessary renewal parts are stated to be unprocurable, while in others the inspectors have added that the substitution of hand for mechanical firing can be blamed. Frequently the inspector has come to the conclusion that the cause of smoke is bad firing, and in one instance it is stated that a visit of the Regional Engineer of the Ministry of Fuel and Power was instrumental in abolishing the smoke entirely.

6.4. In some instances the production of smoke is attributed to the inability to obtain the kind of fuel for which a mechanically fired plant was designed. One authority attributed most of the industrial smoke to pitch-fired boilers.

6.5. In another instance the inspector is of the opinion that variation in quality of fuel fed to mechanically fired plant was responsible for smoke production.

6.6. A steam-raising plant can be built and adjusted to consume smokelessly any kind of coal. In this connection, members of the Executive Council will recall the visit on April 27th to the laundry of the London Co-operative Society at Romford, Essex, where they saw a poor grade of heavily oxidized opencast coal of about

9,000 B.Th.U. per lb., being burned smokelessly in an economic boiler fitted with a coking stoker. If, however, a fairly constant quality of fuel—good or bad—cannot be relied on, it is difficult to see how waste of fuel and the formation of smoke is to be avoided, even with the best of mechanically fired plant.

6.7. One Sanitary Inspector very pertinently remarks that loss of standards due to war-time encouragement in the emission of smoke and now in many cases poorer fuel, is becoming a permanent excuse from both the management's and from the stoker's point of view.

The Chief Sanitary Inspector of one industrial area records that from his experience it is essential to employ a higher standard of fireman, encouraged by a higher scale of pay to study the technique of his work.

The Chief Sanitary Inspector of another authority has publicly announced that in his area records of fuel supplied to many plants in his area have been kept since before the war, and it is found in the majority of instances that grades in use to-day compare very favourably with those supplied in 1938.

A large Metropolitan Borough records a considered opinion that there is a tendency amongst combustion operators to lay all the blame on the fuel, whereas insufficient attention is being paid to the principles of complete and efficient combustion.

One authority records that although fuel is inferior, better supervision of firing has improved local conditions and that one firm attributes a saving of several hundreds of tons of coal to this cause.

One is led to the conclusion that the plea of inferior fuel is rather overdone and is likely to be used as an excuse for inefficiency for some time to come.

6.8. The value of stokers' training courses is frequently acknowledged. One authority says that the lack of training facilities for stokers had had adverse effect since the early days of the war while a neighbouring authority

says that a well-attended course for firemen is held at their technical college.

6.9. Some authorities complain of the difficulty of obtaining domestic appliances for burning smokeless fuel, while others refer to the difficulty in obtaining the smokeless fuel itself, and also of its high price. One Sanitary Inspector makes the rather surprising statement that domestic smoke is due mainly to prefabricated bungalows, which one understood were fitted with the most up-to-date smokeless fuel-burning appliances!

7. Service of the Ministry of Fuel and Power

The assistance that has been given by the engineers and stoker instructors of the Ministry of Fuel and Power is frequently fully acknowledged but the general tenor of reports made by many local authorities, leads to the conclusion that they might make fuller use of the technical services provided by the Ministry. The services of these officers is available free of charge to give advice at any time and the Ministry is ready on all occasions to offer its co-operation in advising on the control of plant, and in the training of firemen.

7.1. The Ministry, in conjunction with the City and Guilds of London, has arranged a series of courses at Technical Colleges throughout the country in the following subjects:

- (a) Boiler House Practice, Preliminary, Intermediate and Advanced grades.
- (b) Steam Utilization.
- (c) Fuel Technology.
- (d) Operation and Maintenance of Fuel Using Plant (Primarily for Works Engineers).
- (e) Operation and Maintenance of Mechanical Stokers.

The support of local authorities for these courses is invited. A list of some of these courses for the 1948-49 session is given in the August number of "Fuel Efficiency News," published by the Ministry, and full particulars can be obtained from the Secretary of the Local Fuel Efficiency Committee at the

nearest Regional Office of the Ministry of Fuel and Power. Where there are sufficient applicants for a particular course of instruction, the Ministry is prepared to arrange for the requirements to be met.

7.2. Training schemes, however, will be of little avail without the support of employers who should be encouraged to appreciate that a properly trained fireman, capable of meeting the requirements of the works with a minimum fuel-consumption, and with no fuel sent up the chimney in the form of smoke and unconsumed gases, is a more valuable asset than a man capable only of shovelling coal on to a fire.

7.3. A fireman on passing his test might be given a certificate of a colour appropriate to the grade, signed by the Ministry and the City and Guilds of London, to fit into a small frame to hang in the boiler house. The certificate should entitle the fireman to a graded bonus that might be co-related to a bonus scheme such as that outlined in the Spring number of "Smokeless Air" for 1948.

8. Sources of Pollution

The sources of pollution recorded are many and varied.

8.1. *Collieries.* In colliery districts complaints arise in respect of steam-raising plant, burning spoil banks, and domestic smoke from the consumption of miners' coal. The first mentioned is probably occasioned by the use of low-grade unsaleable fuel, but it might be possible to modify the boilers so that the consumption of low-grade fuel would not necessarily be accompanied by volumes of smoke. Burning spoil banks are an old problem on which much remains yet to be done.

The smoke caused by the burning of the liberal issue of miners' coal is the source of a large number of complaints by local authorities, some of whom point out that the coal is wasted in old-fashioned grates kept burning day and night. It is probable that much greater service to the housewife in the way of space-heating, cooking, and hot water could be obtained by the consumption of a half or less of the

present issue of coal, were it consumed in an efficient type of stove or grate, and the formation of smoke would be thereby largely avoided.

8.2. *Railways.* Railways are frequently recorded as the source of atmospheric pollution—either from the engine sheds or round houses when firing-up or from shunting in marshalling yards. No ready remedy seems to be at hand in respect to the former, while trains continue to be drawn by steam locomotives, but some amelioration might be obtained in respect of the latter from the increasing use of Diesel shunting locomotives.

8.3. *Shipping.* Local authorities of Port areas complain frequently of the smoke from shipping, sometimes occasioned by deep-sea ships and at other times by river and harbour tugs. It looks as though much greater use might be made of the furnace door for providing a controlled supply of secondary air, devised during the war by the Fuel Research Station. One authority has recorded that during 1947 visits were made on account of smoke to seven vessels, all oil burners. A slight adjustment of oil feed and burner valves was all that was required to avoid the nuisance.

8.4. *Power Stations.* Complaints are recorded frequently—in some 80 instances—of sulphur and grit from power stations. With the establishment of a growing number of large modern power stations, the problem of emission of oxides of sulphur and grit will be of increasing magnitude and difficulty, the solution of which, whatever form it takes, is likely to add to the cost of electricity. Since, however, electricity has become almost the universal source of power and the source of much smokeless heat in the modern world, increased cost may have to be faced.

8.5. *Metallurgical Processes.* Blast furnaces, cupolas, and other metallurgical processes appear frequently as responsible for much atmospheric pollution.

8.6. *Coke Ovens and Gas Works.* Coke ovens and gas works are frequently the cause of complaint, generally in respect of dispersion of grit. In the case of

gas works, it arises usually from horizontal retort houses and the blast from water gas plant in respect of which there seems to be no remedy. There are, however, several complaints of steam-raising plant at gas works.

One local authority reports that the chief discomfort arises from the grit from a battery of coke ovens. The authority has been pressed to erect a number of aluminium bungalows in close proximity to the coke ovens and it is impossible for windows ever to be opened on account of heavy deposit of grit. An extension of the battery is in progress when the nuisance will probably be worse.

8.7 *Laundries.* In more than 150 instances, the laundry is the cause of much atmospheric pollution. In fact a large section of the industry seems to be engaged at a considerable cost to themselves in dispersing soot that they are prepared, at a price, to remove from our fabrics.

One county borough reports that it has five laundries all of which are responsible for heavy smoke, while another seaside town records three laundries all emitting heavy smoke.

One local authority, in reply to the question on the form relating to Part I of the Survey as to whether conditions were better or worse than in 1939, replied that they were much better, and gave as a reason the fact that the local laundry had been burnt down. Many authorities reported their only source of smoke as domestic chimneys and the laundry. Sanitary Inspectors frequently report that the steam-raising plant is old and overloaded, and that replacement parts are not obtainable. While not suggesting that the drastic remedy above referred to should be applied universally, it may be that something might be done to enable laundries to raise steam without defiling the atmosphere. The one at Romford already referred to is an outstanding example.

8.8. *Clay Industries.* Brickworks, tileries and potteries appear with regularity as defilers of the atmosphere. Some of the more highly developed potteries and tileries, it is well known,

are in course of turning over to smokeless tunnel ovens, but it is a question whether something could not be done to improve the performance of the local brick and sanitary pottery works.

8.9. In addition to the sources of pollution mentioned above, there frequently occur as offenders breweries, textile and paper mills in respect of their steam-raising plant, chemical works from fumes and also steam-raising, and dyeworks where large volumes of low-pressure steam are required at intervals. There are many complaints of obsolete, worn out and overloaded plant and it is recorded in several instances that new plant or replacements are on order but cannot be obtained. In one case it is recorded that a plant designed to burn coke has had to burn raw coal owing to coke being unobtainable. Dust from cement works is a frequent source of complaint. In one district a committee of representatives of local authorities has the matter under consideration. One authority records the collection of dust from a quarry in ducts but of the final disposal of the dust by blowing it into the air, when it is distributed over dwelling houses. Government establishments such as Royal Ordnance Factories are frequently mentioned as responsible for atmospheric pollution. A town in Scotland reports that the purifiers at its gas works are inadequate to deal with the increased output.

9. There are also frequent complaints about public institutions such as baths, hospitals, etc., which would seem to be within the control of local authorities themselves. Again another municipal plant that seems responsible for much smoke is the refuse destructor. It is said in some instances to be due to attempts to burn wet refuse, which of course is likely to give trouble.

9.1. On top of this is the all-pervading domestic smoke and the steam-raising plant associated with small local industries. Very often the latter are fired with wood or other refuse, which makes a readily available source of heat and which is capable of being burned smokelessly in proper plant,

but when fed irregularly on to the fire in small locomotive type or vertical boiler, is likely to be the source of great annoyance to the neighbourhood.

9.2. One or two authorities exhibit some anxiety as to the effect of the establishment of the projected satellite towns in their areas.

10. Outlook of Local Authorities

The Survey has disclosed the great difference in outlook that exists on the problem of the pollution of the atmosphere. In some quarters mankind seems to have become so accustomed to living in a smoke-laden atmosphere as to be unconscious of his environment.

10.1. In their response to the Society's questionnaire, local authorities display very different outlooks. There are those intensely conscious of the problem, anxious to take systematic measures to ascertain the intensity of pollution and ready to take all measures within their powers to improve the conditions of their area. They frequently give evidence of a sense of frustration in the lack of interest of owners of fuel-burning plant, and of the employees operating it, and in the lack of support from higher authority. They have generally gone out of their way to give the Society all available information, and for the helpful attitude they have adopted the Society expresses its gratitude.

10.2 Other authorities have shown a limited interest, sufficient to cause them to become associated with the movement to obtain a cleaner atmosphere and to obtain such information on the subject as may become available. The Society is grateful for their support and their help, and ventures to express the hope that their interest will increase and that they will yet take a more active part in the campaign. Quite a large proportion of those addressed disclose a complete lack of interest: some have indicated their lack of interest, while others have ignored altogether the Society's questionnaire. It is hoped that their interest in this important problem will be awakened and that they will ultimately take their places in the

campaign for the prevention of smoke, which not only defiles our land, but is the visible indication of the wasteful use of our vanishing supplies of fuel.

10.3 Many local authorities record drift of pollution from other areas, and in highly developed areas such as Lancashire, Yorkshire and London, this is inevitable. This factor gives some force to the suggestion that has been put forward that joint local committees should be established in all areas.

10.4. It is worthy of note that although atmospheric pollution is the responsibility of the Local Authority's Medical Officer of Health and the Sanitary Inspector, the returns in many instances bore only the name of the Town Clerk or Clerk to the Council. This applies to about one-third of the returns reporting no atmospheric pollution.

11. Conclusion

The preceding summary, subject to such reservations as may have to be made on account of the incompleteness of the return and for the reasons already mentioned, gives a brief outline of the commonest causes of atmospheric pollution. It accounts for some fraction of the millions of tons of smoke, soot and associated unconsumed gases that we continue to put into the atmosphere each year, and as a result are compelled to spend considerable sums in cleaning and repairing stonework, replacing corroded metal work, renewing paint, washing fabrics and so on.

11.1. Has the Survey been worth while? This question can be answered very definitely in the affirmative. It has shown first of all that the principal sources of pollution fall into separate categories:

There are those associated with industries such as coal-carbonization, metallurgical processes, power stations, etc., where the smoke, sulphur and grit problem is not capable of a ready complete solution and where research and experiment on a considerable scale is still necessary.

In these and in other instances, partial solutions would seem to be available. There seems to be no reason why steam-

raising plant at collieries should not be operated in a manner to give less offence although a good deal of work appears to be necessary on spoil banks. The gradual substitution of Diesel shunting locomotives should improve the conditions in marshalling yards, but while the steam locomotive is the chief source of railway traction, engine sheds are likely to be the source of atmospheric pollution. The increasing use of water-tube boilers in new ships and improved control of combustion should contribute to some improvement in conditions of which local authorities in port areas complain, while in other instances a remedy is to hand, in the furnace door produced during the war by the Fuel Research Station, the use of which should be encouraged.

On the other hand, many other sources of pollution should be capable of being remedied by means already to hand. The steam-raising plant of textile mills, breweries, laundries, and other industries should be capable of more efficient operation to the financial advantage of their owners, by some improvement in the technique of firing, and by some modification of plant as and when circumstances permit. There is a general consensus of opinion among officers of local authorities that stoking leaves much to be desired. A remedy might be found in the adoption of a scheme recommended by some of them, in which firemen, or at least the younger of them, should be examined and on certification promoted to a higher scale of pay. Some of the courses already available for training firemen have been referred to briefly in paragraph 7 of this report.

12. With regard to domestic smoke that forms such a high percentage of the general atmospheric pollution, it is anticipated that by the time this report is presented the production of stoves and open grates for burning smokeless fuel will meet the requirements for all new houses. There would then be no reason why housing authorities should not install such appliances in all new housing schemes. Could we hope that the Ministry of Health and the Depart-

ment of Health for Scotland would consider the advisability of instructing local authorities to insist on the installation of stoves or grates for smokeless fuel in all new houses whether publicly or privately built. Even where smokeless fuel is not immediately available, these grates will burn bituminous coal more efficiently, and consequently produce less smoke than the older types of grates, until such time as smokeless fuels are available in sufficient quantities, and it is to be hoped, at lower prices than at present.

12.1. As the production of smokeless appliances increases, it should be possible to evolve a policy to encourage the replacement of grates of older types by those for burning smokeless fuel, or in blocks of flats and tenements by efficient central heating systems.

13. The Society's efforts to carry out this national survey of atmospheric pollution, the results of which have

been outlined above, have made it clear that an authoritative survey will be possible only if undertaken under Government authority by the Departments directly concerned, with systematic observations and measurements. Such a survey is a matter of some magnitude, and before that can be launched there is much that has been disclosed by the Survey that can be undertaken to prevent a very considerable part of the pollution of the atmosphere of the country.

14. This very brief interim report is based mainly on the report in general terms given on Part I of the survey, reinforced by reference to the detail on Part II. The analysis of Part II will be a matter of some magnitude on whatever basis it is undertaken. This will be carried out in due course: but meanwhile many members of the Conference may have views as to how the analysis should proceed.

PROGRESS REPORTS

Introductory Review

By ARNOLD MARSH, *General Secretary*

THE reports we are to discuss this afternoon constitute a new feature of these conferences. If the session is successful, which I think it will be because of the encouraging nature and wide range of information contained in the reports, then I hope it will be decided to have similar sessions at all future conferences. The reports are, of course, only a selection of the many that could have been invited, and it may well be that other topics should have been included. Another time the pattern may be quite different.

We have called them, with no great originality, simply "Progress Reports," but it will be noted that none of them actually record the ultimate progress that is the only real measure of the success of this work of ours—none of them, that is, record any observable

improvement in the state of the atmosphere. They are all records, in one form or another, of preparatory steps taken either to prevent a worsening of conditions or to improve conditions in the future.

This in no way detracts from their value, for such work is the essential foundation of the positive progress we seek. Nevertheless, I must confess to a burning ambition to be able to comment on the kind of report we have recently been receiving from Pittsburgh and other cities in North America. At bottom, no doubt, this is simply a feeling of envy, and for a moment I should like to try to infect you all with the germs of that most useful stimulus.

Perhaps therefore I may apparently digress by first looking at Pittsburgh, and from there work back to our own reports.

In his Presidential Address at Edinburgh last year, Sir George Elliston mentioned that on the same day, 1st October, Pittsburgh's new smoke prevention ordinance came into force. To-day, then, it has been working for exactly one year. In effect, it seeks to turn the whole of the city into a smokeless zone, by means very similar to those towards which we are gradually moving. The ordinance regulates both the fuel that is used and the plant in which it is burned. The use of high volatile bituminous coal—the source of most of the smoke—is forbidden in all but mechanically-fired furnaces. In all other appliances only coal with a volatile content of less than 20 per cent. may be used. This applies to domestic as well as to industrial installations.

Not only is the prior approval of new and reconstructed installations required, but equipment other than domestic is subject to an annual inspection and the issue of a certificate of operation. Locomotives must use solid smokeless fuel or be equipped with mechanical firing. Penalties are of course maintained for emissions of smoke, grit or fumes that exceed defined limits.

It was not too easy to apply and enforce the new regulations during this first year, thanks to unusually severe winter weather and a consequent scarcity of solid fuel, but they have come through the test with flying colours. Pittsburgh does not yet claim, of course, to be free from smoke, and it suffers from the heavy pollution of the great steel manufacturing plants and other industry outside the city limits.

Nevertheless, their progress report is that during the past winter they enjoyed 39 per cent. more sunlight than during the previous winter. Comparison between two single years is not of course a conclusive proof of improvement, but in this case it is claimed that weather conditions were such that without any change in smoke output there would have been less sunshine than during the previous year. An important article on Pittsburgh's campaign, by Mr. Arnold Reif, a member of the Society at present engaged in research work in that city, will be

published in the next issue of *Smokeless Air*.

To ourselves, the moral of this, and of other experience in the U.S.A. and elsewhere, is that the policies the Society has been advocating and discussing—smokeless zones, control of the sale and use of coal, prior approval of installations, and so on—are workable, reasonable, and successful. It is not suggested that we should imitate American practice in all respects, and in particular I think it will be agreed that we do not want individual cities to go so far ahead on their own that they would absorb more than their fair share of smokeless fuels and new appliances. The alternative to such unilateral action is to plan progress in stages in the cities and areas where such action is most necessary: in other words, by the establishment of expanding smokeless zones.

From this glance at the final target we can come back to look at the first of the reports that are the real subject of these comments: the smokeless zone clause of the Coventry Corporation Act. This is of particular interest, for although similar clauses in other local Acts have been agreed to largely in default of any opposition, circumstances in Coventry led to an actual ballot, for or against, among the citizens. The substantial majority in favour of a smokeless zone is a most encouraging endorsement of our belief that the measures we propose will, when once they are fully explained and understood, be supported by the people—whether they are in Pittsburgh or in Coventry.

Reference is also made in this report to the clauses of the Coventry Act that require new fuel-burning installations to receive prior approval: a principle that is an essential part of all modern smoke prevention legislation, as we can see not only in Pittsburgh but in a hundred other American and Canadian (and even Indian) cities.

The fears that have been expressed from time to time that prior approval would not work, or that it could not be worked even by properly qualified local authority officers, are shown to be

groundless by the reports on such schemes in Leeds, Sheffield, and Birmingham. In each case the administration of the scheme has obviously been reasonable, understanding, and constructive. This pioneer work is a valuable guide to other authorities and helps to clarify the principles and practice we wish to see in the national legislation that is to come.

Here, I think, we may claim really tangible progress, not in reducing existing pollution, but in preventing new. The modifications to plant that have been secured must in many cases have done much to ensure both better fuel efficiency and less smoke than would otherwise have been the case, but beyond this there are benefits that are likely to have accrued unseen through the mere existence of the control. The knowledge that plans will be vetted must in itself raise standards and ensure more foresight and care.

Unfortunately received too late for inclusion in the advance printed papers, is a report from the City of Salford, which has also recently obtained a new Act. One or two paragraphs in this report are of such importance that I propose to quote them in full.*

Progress of another kind is indicated in the reports about the Carrington Power Station and from Thames-side. Here we see local authorities getting together to solve their common problems. In the one case it is an essential step in the prevention of a possibly serious source of new emission; in the other it is a joint attack on a problem of many years' standing.

The important feature of the Walsall report is the same as that in the one about Carrington—namely, the keeping of atmospheric pollution records in an area where new development is taking place, so that conditions before and afterwards can be statistically compared. In this connection it may be of interest to note that observations are being made by the D.S.I.R. in the Stevenage district, so that as the new town comes into being it will be possible to see the deterioration—or, as we hope, absence

of deterioration, in the state of the atmosphere. Such work is of great importance and is commended to all local authorities with similar development schemes in prospect.

A different type of local authority co-operation is that recorded from Bristol. Here we have an excellent example of joint action in smoke prevention between the different departments of the one local authority. How many opportunities, one wonders, are lost by a lack of an early pooling of ideas and exchange of information about projects, and a conscious effort towards full co-ordination. This is perhaps something that most directly concerns the larger authorities, and the scheme should be noted particularly by their representatives here to-day.

From the Fuel Research Station comes a report of progress in the task of abolishing domestic smoke—the foundation work of testing the new appliances that among other things will make possible the general use of smokeless fuels. This is a kind of progress report that the public will hardly note or appreciate, but which must be done before we can advance towards our objective of smokeless homes.

More immediate in the progress it will provide is the furnace door described in the other Fuel Research Station report. This simple invention—and successful perhaps because of its simplicity—was first applied to prevent tell-tale smoke from merchant ships in danger from U-boats. Thus an invention to save life in war is being used to safeguard health in peace.

The final report, on central and district heating schemes, is another important example of progress being made to prevent new smoke coming into being. District heating should be welcomed and encouraged by the smoke abatement movement, although the case for it has perhaps been endangered at times by over-enthusiastic claims. The proof of the pudding must of course continue to be the traditional one, and it is excellent that there should be so many schemes now in train, which should clearly demonstrate the extent of the field over which district

* See page 37

heating can and should be applied. It seems certain that it will be large enough to make a really substantial contribution to our cause.

Since time has allowed only a brief mention of each of the reports, it has seemed necessary to look only for the most significant point in each. And thus, although from none of them can we extract anything like that remarkable

39 per cent. increase in sunlight that is the news from Pittsburgh, each one, in its own way, shows some tangible and essential step forward. If we will but persevere and redouble our efforts I have no fear that we shall, before very long, have reports of more sunlight, diminishing soot deposits, bigger fuel savings, and public gratitude, flowing in from all parts of the Kingdom.

The Coventry Corporation Bill

1. Following the conference of the National Smoke Abatement Society held at Brighton in October 1946, a fellow delegate and myself submitted a report of the Conference proceedings to the Health Committee embodying in the report certain recommendations with a view to the prevention of smoke emission from industrial sources. In addition I wrote to the Town Clerk stating that the time was now opportune, in view of the proposed reconstruction of the City Centre, to take steps to prevent as far as possible, atmospheric pollution by the emission of smoke from industrial and domestic buildings and suggesting that in the event of any new legislation being contemplated locally, appropriate provisions for the prevention of smoke emission into the atmosphere should be introduced.

2. In November 1947, a private bill was drafted primarily to empower the City Council to construct waterworks and take further water from the river Avon. Clauses were drafted in the bill to secure other powers to deal with nuisances, sanitary matters, etc., including the prohibition of smoke in certain areas, i.e. to establish smokeless zones; also to prevent the emission of smoke from industrial furnaces, by prohibiting the installation of furnaces for industrial purposes which are not so far as practicable capable of being operated continuously without emitting smoke.

In addition clauses were included to empower the Council to establish works for the provision of heat and hot water, i.e. to introduce a system of "District Heating."

3. Many difficulties and much prejudice had to be overcome before the bill reached the Committee stage.

Owing to the inclusion in the bill of certain clauses relating to the provision of a municipal taxi service, provision of hotels and other trading clauses, an electors' meeting was held and each clause was voted upon. At this meeting the clauses relating to "District Heating" and "Smokeless Zone" were opposed and lost. Fortunately, however, in view of the large number of citizens who were unable to gain access to the hall on the night of the meeting, the Council decided that the fate of the opposed clauses should be decided by ballot. A ballot was held and the results of the voting of the citizens in so far as "District Heating" and "Smokeless Zones" were concerned were as follows:

	<i>For Against Majority</i>		
District			
Heating	26,934	12,555	14,379
Smokeless			
Zone	27,990	11,302	16,688

(The total number of votes was 40,775, equivalent to 23 per cent. of the total electorate (180,000).)

4. Smokeless Zones

As is well known Coventry suffered

extensive damage by aerial bombardment during the recent world war and the central area comprising the shopping centre, was completely demolished. Plans have been prepared for the reconstruction of this central area which will form the centre of the "Smokeless Zone" comprising a district of approximately 30 acres.

5. In order to ascertain the number and nature of fuel burning appliances in the buildings included in the area a survey was undertaken. Each building was visited and particulars obtained of types of burning installations in use and the quantities and nature of fuel consumed.

6. The survey indicated that the majority of premises relied upon gas and electricity for heating; in only one instance, in a restaurant, was solid fuel used for cooking and in this case there were several stoves, all except one being heated by gas. It was apparent that the creation of a smokeless zone in the area would be a practical proposition and unless the opportunity was taken to seek the necessary powers the injurious effects upon the health of the community and the deleterious effects upon the new buildings to arise from the ruins of the old, would continue.

7. Some opposition was forthcoming from certain sections of the electorate with regard to a smokeless zone on the ground that the clause did not make provision for the payment of compensation to meet cost of installing new grates or furnaces in every case, the clause reads as follows:

"The Corporation *may* if they think fit contribute to the whole or part of this expense necessarily incurred in executing works for the purpose of complying with the clause."

This opposition was, however, withdrawn before the bill reached the Committee stage and the entire clause has since been allowed.

8. The powers in the bill can be applied to any area or areas in the City which may be prescribed by order made by the Council and confirmed by the Ministry of Health.

Thus an opportunity arises and as the public become more smoke conscious and old prejudices are overcome, the zone can gradually be extended.

Prevention of Smoke from Industrial Furnaces

9. This clause gives power to prohibit the installation in any building of any furnace for steam raising or for any manufacturing or trade purpose, unless such furnace is so far as practicable capable of being operated continuously without emitting smoke.

10. If the person before installing in a building a furnace, submits plans and particulars of the installation, the Corporation shall within six weeks serve a notice upon the person stating whether or not they are satisfied that the proposed furnace is so far as practicable capable of being operated continuously without emitting smoke. If they are so satisfied or if they do not serve a notice upon the person as required, no proceedings can be taken against the person under this section. A person who installs a furnace and who does not give notice to the Corporation can be proceeded against in the event of the installation emitting smoke and is liable to a penalty not exceeding £10 and a daily penalty not exceeding two pounds.

11. The Ministry of Health submitted reports in Committee commenting upon this clause to the effect that "He does not think this clause adds anything useful to the provisions of the general law regarding pollution of the atmosphere, which is the only aspect of the matter with which he is concerned."

(2) "He considered that it would be difficult for the Corporation to decide at the "Plans" stage whether the installation of the furnace would contravene sub-section (1) of the clause, i.e. the sub-section which prohibits the installation of any furnace unless it is as far as practicable capable of being operated continuously without emitting smoke."

12. With regard to objection (1) it was pointed out that the object of the clause was to ensure that all new furnaces

installed are from the start as far as practicable capable of being operated continuously without emitting smoke, i.e. that the best known type of furnace available at the time of installation is used, and thus prevent a nuisance arising, rather than allowing the nuisance to arise and then attempting to cure it.

13. With respect to query (2) it was explained that this could be decided by any qualified and experienced Smoke Inspector and that it was already his duty to decide on types of installations, when dealing with smoke nuisances.

Following these explanations in Committee the Ministry of Health raised no further objection and after the members of the Committee were

reminded that very similar provisions had been given in the Preston Bill recently before Parliament both clauses were allowed.

14. In conclusion it is significant from the proceedings that with respect to the establishment of a "Smokeless Zone" in existing industrial areas the cost involved in new installations appears to be the primary factor, and secondly that in regard to the "prior approval" clause, evidence must be forthcoming that a local authority has qualified Smoke Inspectors, who are experienced to judge at the "Plans" stage whether a particular type of furnace or installation will operate satisfactorily.—*W. Beaumont, Chief Sanitary Inspector, City of Coventry.*

Carrington Power Station

A JOINT Committee representative of the Borough Council of Stretford and the Urban District Council of Urmston in South East Lancashire, and the Borough Council of Sale and other more distant Local Authorities in North East Cheshire, have met with a substantial measure of success in impressing upon the Electricity Commission the need for precautions to be taken against pollution of the atmosphere by discharges from the 330 foot chimney of the new power station that is to be built at Carrington. At the outset directions were given by the Commission to ensure that this generating station, which is to have an ultimate capacity of 400,000 kilowatts, shall incorporate electrostatic precipitators designed to arrest smoke and grit.

In regard to the emission of sulphur and its compounds into the atmosphere, whilst the Commission declined to order the installation of gas washing plant as an integral part of the station from its beginning, they directed provision to be made for such installation at a later date and, as appears below, there is a prospect that consideration will be given to the desirability of ordering the installation of suitable plant on evidence being adduced by

the Local Authorities to show that sulphurous emissions are in fact causing measurable pollution.

The Local Authorities, after taking the advice of the Department of Scientific and Industrial Research, have resolved to set up measuring instruments in various parts of the area by which it will be possible to establish scientifically the incidence of atmospheric pollution before and after the power station is put into operation.

At an interview in London between a deputation from the Joint Committee and the Chairman and other representatives of the Commission, it was pointed out on behalf of the Commission that gas washing had only so far been directed at two stations, i.e., Battersea and Fulham. The Battersea system, it was stated was only possible where almost unlimited quantities of water were available. At Fulham, the required amount of water not being available, another system, known as the "closed system," had to be adopted. Under both systems an elimination of about 95 per cent. of the sulphur in the flue gases was achieved.

The deputation were informed that the Battersea system could not be operated at the Carrington Station and

that the Commissioners felt they would not be justified in directing the adoption of the Fulham system, which in certain respects had proved to be unsatisfactory. Certain experiments were now, however, being conducted and the Chairman of the Commission stated that, whilst he could not, at the time of the interview (January, 1948) commit the Ministry of Fuel and Power, who would be responsible after the dissolution of the Commission, he felt sure that the Ministry would give sympathetic consideration to any representations by the Local Authorities and that the Minister would have regard to the readings of the test instruments which the Local Authorities were to install under the guidance of the D.S.I.R. in support of such representations.

This intimation was distinctly more satisfying than the Commission's previous communication to the effect that the adoption of gas washing would not be directed except on evidence that the discharge of sulphur and its compounds into the atmosphere was having a "harmful effect." It might have been difficult to prove that sulphurous emissions were literally causing damage to plant life or to materials, or injuring human health. The Local Authorities had submitted throughout the negotiations that if, as the result of the operation of the station, there was a measurable increase in atmospheric pollution, then that in itself would be justification for the adoption of gas washing. It is to be noted that, whilst the Commission have not gone all the way with the Local Authorities in this, there is reason to believe that the measuring instrument readings will be accepted by the appropriate Authority as evidence to be carefully weighed.

As to the measuring instruments to be set up by the Local Authorities as

mentioned above, these are to be 28 in number and in the main are to be sited at points one mile apart with some at two mile intervals. Some of them will be situate to the south and west of the power station but the majority will be in the path of the prevailing south-westerly winds by which the chimney emissions will be borne. As plotted on a map the stations are shown roughly as at the intersections of vertical and horizontal lines describing one mile squares. There are to be six combined stations comprising lead peroxide apparatus with deposit gauges (at Ashton-upon-Mersey; Warburton; north of Carrington village; Irlam; between Flixton and Urmston; and near Broadheath, Altrincham). Sixteen lead peroxide stations are to be distributed between Stretford, Sale, Altrincham, Ashton-upon-Mersey, Urmston, Davyhulme (2), Sinderland, Carrington, Flixton, Partington (2), Irlam and beyond (4).

The supply of apparatus, arrangements for analysis, submission of returns to the Department of Scientific and Industrial Research, and reports to the Local Authorities are matters which the Manchester and District Smoke Abatement Committee have in hand, the Committee having agreed to act as agents for the Local Authorities and where necessary to collaborate with the Manchester Corporation Electricity Department. The Committee will, of course, be reimbursed by the Local Authorities in respect of the cost of analysis and other incidental expenses. These costs are to be borne as to a quarter each by Stretford, Urmston and Sale and as to the remaining quarter by the other Local Authorities situate more distantly from the power station.—*L. Watkins, Clerk of the Council, Urmston District Council.*

Developments in Walsall

Recording Pollution

FOR many years, in co-operation with the Department of Scientific and Industrial Research, one atmos-

pheric pollution gauge was operated. In 1946, the Council decided that in order to maintain a closer check on the general level of atmospheric pollution

throughout the Borough, four additional deposit gauges be installed on sites approved by the D.S.I.R.

When it was known that a new power station was proposed to be built in the Borough, arrangements were made to have lead peroxide gauges installed, and in July 1947, five gauges were placed at the same stations as the deposit gauges. Two additional lead peroxide gauges have been operating since April this year, so there are now five deposit gauges and seven lead peroxide gauges. While siting of the gauges is not an easy matter, it is hoped to establish a further five lead peroxide gauges at an early date. Analysis of the deposits by the Chemist at the Corporation Sewage Works, provide evidence of the degree of contamination in industrial and residential areas of the town. Records of pollution are published quarterly in Council Reports, and it is found that such publication is extremely useful in that it focuses attention on atmospheric conditions and encourages discussion as to amelioration of pollution. In the Council and local press there is evidence of a growing "smoke" consciousness which is encouraging.

Positive Action

The Council have appointed a specialist sanitary inspector to undertake smoke abatement work.

Attention is being directed to persistent offenders, and in such cases a series of tests are arranged over a continuous period of five or six hours when loads are heaviest. The quantity and nature of fuel fired, the methods and frequency of firing, and readings of control instruments are recorded on specially prepared charts.

A Cambridge CO₂ and flue gas temperature indicator has been purchased for the use of the department.

Simultaneously, a graph showing variations in smoke density throughout the period of the test is prepared.

Comparison of the two charts provides valuable information as to the causes of the smoke emissions and indicates possible remedies. This method has been helpful, and has been

appreciated by the managers of the offending undertakings. Unfortunately, these tests make heavy demands on the Department's technical staff, and in consequence have only been used on a limited number of occasions.

The helpful advice of the Regional Officers of the Ministry of Fuel and Power is readily available in all cases of difficulty.

Local Authorities' own boiler installations are being given special attention and it is hoped that these will soon give no further cause for complaint.

Publicity

Endeavours are being made to educate the public on the problem of atmospheric pollution in the town, and to indicate to them the broad lines along which a solution lies.

Examples of efforts in these directions are :-

- (a) Talks to Youth Movements, Clubs, Religious Organizations and Womens' Guilds.
- (b) Circularising of occupiers of factories and commercial buildings in connection with the recent Survey of the Sources and Incidence of Atmospheric Pollution. Such occupiers have been invited to make suggestions for reducing atmospheric pollution and to discuss their own problems with the Department's Officers.

Legal Powers

Although Walsall has at present no legal power requiring users of fuel-burning plants to obtain prior approval of the local authority, an inter-departmental arrangement has been made for copies of plans of factory and commercial buildings to be submitted to the Chief Sanitary Inspector for his comments. Where it is proposed to install new plant of a type likely to cause nuisance, a report to this effect is made through the Borough Surveyor to the Public Works and Town Planning Committees. In such cases informal efforts are made to secure modification of the proposed plant so as to eliminate or reduce smoke nuisance. Where applicable, use is made of the provisions

of the Town and Country Planning Acts to control the establishment of trades likely to cause smoke or other nuisance.

Every endeavour is made to secure the co-operation of factory manage-

ments in the work of smoke abatement. The Department's policy is to resort to legal sanctions, only in the case of persistent and unco-operative offenders.

—*C. A. Stansbury, Chief Sanitary Inspector, County Borough of Walsall.*

Prior Approval in Birmingham

WHEN the Public Health (Smoke Abatement) Act, 1926, was repealed and re-enacted by the appropriate sections of the Public Health Act, 1936, it became apparent that from a legal point of view no great change had been made towards the elimination of smoke nuisances. Therefore, when the 1936 legislation came under review, the Medical Officer of Health, having regard to the excellent results already obtained by the advisory work done by competent and qualified inspectors, recommended to the Health Committee that this work should continue, and could usefully be employed in implementing Section 101, paragraph (a) and (b), which deals with installations and chimneys, and Section 103, subsection 3, which defines "best practicable means."

The extension of this advisory work was based on the logical conclusion that endeavouring to ensure good combustion conditions in the firegrate of new installations was as equally important as dealing with the installation or chimney as a statutory nuisance should that event arise.

The co-operation of the City Surveyor was readily obtained with the result that arrangements whereby all plans submitted to the Local Authority for approval under the building by-laws, and which relate to industrial chimneys, boiler houses and industrial buildings showing boiler and furnace space are passed to the Public Health Department for comment.

By this arrangement it is possible for those engaged on smoke prevention to approach the owners or architects, who deposit the plans, and to discuss with them the type of plant proposed to be used, and the necessity of pro-

viding the best practicable means for preventing the creation and emission of smoke or grit, so eliminating as far as possible in this early stage the likelihood of any nuisance arising.

To avoid delay in the approval of these plans this informal advisory work entails prompt attention and tactful approach, but in most cases it has been proved that any suggestions put forward or any advice tendered has been in the main accepted by the owners or the architects. The plans are then returned to the City Surveyor with any necessary comments for consideration by the appropriate Committee.

By this means 248 plans have been brought to the notice of the Public Health Department and have included all types of steam raising boilers, incinerators, gas producers, sectional heating apparatus, bakery ovens, drying ovens, re-heating, melting and enamelling furnaces, together with numerous iron and brick chimney stacks.

The fuels used vary, with the majority being coal fired with natural or forced draught conditions—about 12 per cent. utilize mechanical stokers; 6 per cent. use oil fuel and 2 per cent. pulverized fuel, with isolated cases burning trade process refuse.

No adverse comment was necessary in 125 cases of the remainder; such matters as the provision of grit arrestors, use of mechanical stokers, provision of dampers, use of coal on small vertical boilers, advantages of economizers, use of instruments, pre-heating arrangements for oil and creosote pitch fuel and insufficient height of chimney stacks, were matters which the Department found necessary to draw to the attention of the depositors of the plans. In the majority of these cases sugges-

tions made during discussions are generally appreciated and acted upon. This is especially noticeable when dealing with the Architects—no doubt because they appreciate discussion at an early stage on new developments and also their desire to contribute towards general amenities.

The question whether prior approval of new fuel burning installations by the

local authority or other competent body should be obligatory or not remains for future national legislation but it can be stated that the advisory work as carried out in this informal manner especially in the early stage can be most valuable and in practice quite successful and a contribution towards smoke abatement.—*G. W. Farquharson, Senior Smoke and Factories Inspector, City of Birmingham.*

Prior Approval in Sheffield and District

IN the larger cities of Great Britain, there is nothing new about the "Prior Approval" of heating apparatus, which has been carried out for years, but has now become intensified owing to the advancements made under the Town and Country Planning Acts, 1932 and 1944, together with Leasing Clauses which have been added to certain Corporation by-laws.

In March, 1946, a clause was inserted in the Sheffield Corporation Leasing of Land which stated :

"All fuel burning apparatus shall be of a type to be approved by the Corporation and shall be such as is adopted for the burning of smokeless fuel, or shall be so constructed as to consume or burn any smoke arising therefrom and the lessee shall, before installation, of such apparatus, obtain due approval of the Corporation to the specification thereof."

Shortly after the insertion of this clause, it was found that adjoining Corporation property, which was to be re-developed, was not subject to any restrictions and this was reacting to the disadvantage of Corporation land, particularly in the central and residential areas; so it was resolved to ask for similar conditions under the Amenity Clauses of the Town and Country Planning Acts of 1932 and 1944. Since that time, over 600 plans of new and reconstructed premises have been supervised and advice and assistance given with regard to fuel burning apparatus.

Having due regard to fuel shortage, also to the difficulty of heating engineers to choose the type of fuel to be burned and the type of apparatus to be installed, this task of mutual decision has not been an easy one and there have been times when it appeared impossible to obtain a reasonable standard of smokeless conditions in the residential and central areas.

Tribute must be paid to manufacturers and architects alike, who have appreciated what was being attempted and have at times altered their heating plans completely, in order to add their quota to the scheme of smoke prevention.

There have been individuals who looked upon this scheme as "Unwarrantable interference" which was "curtailing the right of the individual to use the type of apparatus and fuel he wanted to," having little regard for his neighbour or amenity.

There have been only seven appeals to the Planning Committee against the decision of the Officers and these have in every case been amicably settled, though in certain cases, provisional relaxation of "Standards" has had to be agreed upon.

It has been stated that over 600 plans have been approved, but it should be added that each year over 2,000 plans of new and altered premises have been dealt with by the Plans Sub-Committee, the majority of them not having any heating apparatus to consider.

Arising out of this arrangement of

"prior approval," there are certain features to which attention can be given.

(a) In the central and residential areas, gas or electrical heating has been asked for, though in certain cases, oil-fired central heating has been agreed upon as an alternative.

(b) Coal-fired apparatus with mechanical stoking has not been approved of as being entirely smokeless, but has been freely installed in the Light Industrial Areas and in the Heavy Industrial Area. A minimum height for a chimney has been kept at forty feet, but the contours in Sheffield make uniformity of height difficult.

(c) Coke-fired central heating boilers and slow combustion stoves have not been looked upon with favour, for it has been proved that where hand firing is in operation, coal, wood and industrial refuse have been used on many occasions and caused considerable nuisance. This was particularly prevalent during the crisis period in 1947, but has continued since, when there was no necessity for it. In practice, it is found that a coal fired heating plant with a mechanical stoker, is preferable

to a hand fired coke boiler, as it is not so easy to dispose of undesirable trade refuse in this type of apparatus.

(d) The need for reliable certificated stokers who have a technical knowledge of combustion appliances has been fully emphasized since these new conditions of prior approval have been put into operation.

In conclusion, it can be stated that progress has been made, though it is much too early to appreciate the far-reaching effects of the work that has been accomplished. The amount of time and consideration necessary to ensure good combustion conditions is considerable and minor errors have been made with regard to the types of appliances being installed. There are good and bad types of mechanical stokers, as well as stokers that are only adapted for "light duty" working, which are of little use to manufacturers with heavy fluctuating loads. The experience of the past two years has been well worth while and it is hoped that further progress can be made and will show the desired results in the next ten years.
—James Law, Chief Smoke Inspector, Sheffield, Rotherham and District Smoke Abatement Committee.

Prior Approval in Leeds

DURING the past 2½ years, 82 proposals for alterations to existing furnaces or chimneys, or the construction of new boiler plants, were submitted to the Corporation for approval. Of these, 41 were approved without comment and 41 were approved subject to various modifications.

31 of the 41 schemes approved without comment were designed to use some form of smokeless fuel, but for various reasons, two have since been converted to burn coal, using underfeed stokers. The other ten furnaces were coal burning, but, of these, seven were fitted with underfeed stokers, one was fired with pulverised coal, one was a sulphur refining plant provided with sprinkler stokers and a very tall steel

smoke stack, and one was a Lancashire boiler installation which is to be modified in the near future. The average chimney height for all these cases was 49 ft. 6 in., excluding two 375 ft. chimneys for a new electric power station.

The 41 projects which were queried included three sent back because of insufficient information. Eleven other proposals were queried because smoke producing fuels were to be used, and 27 because the proposed chimney heights were, in my opinion, too low. Undertakings were subsequently obtained that smokeless fuels would be substituted for the smoke producing fuels in the eleven cases just mentioned. The average height of the proposed chimneys in the other 27 cases was

34 ft., but, as a result of my representations, I have secured increases varying from 6 ft. to as much as 30 ft. ; bringing the average chimney height up to 46 ft. These increases do not, of course, play any part in reducing smoke emissions, but they do help to minimize nuisances which might occur.

It has been the Corporation's policy for many years to require smokeless fuels to be used in new boiler plants. This policy still applies, but there is considerable difficulty at present in obtaining adequate supplies of such fuels. In particular, it is not easy to get allocations of special fuels from the Ministry of Fuel and Power. This has caused the Corporation to relax their policy in certain cases and allow coal to be used if coking type and underfeed stokers were fitted. Here again, however, it is not always possible to obtain allocations of graded coals suitable for use in these stokers and I have found, by experience, that the use of unsuitable fuels (for example—ungraded opencast coal) may give rise to nuisance because the high ash content causes the coal to clinker badly and so necessitates frequent disturbance of the firebed, and also because, in many cases, the lower calorific value of the fuel makes it difficult to meet steam demands without forcing

the boilers. I have one case in mind in which the use of such coals with an underfeed stoker caused very strong complaints of nuisance to be received, although this particular plant had been in use for many years without complaint while burning good coal. Even in this case there was considerable difficulty in persuading the Coal Allocation Officer to grant supplies of more suitable fuel, and it was not until a statutory notice was served upon the firm and transmitted, in turn, to that Officer, that an allocation was given.

Another problem is the difficulty which sometimes arises in reconciling the differing views of the Health Department and the Town Planning Department about the height of a new chimney. In some cases we have compromised by accepting a lower height, subject to an undertaking being given that the chimney would be raised if nuisance occurred. In one or two instances this has meant that the foundations and thicknesses of brickwork have had to be adjusted so as to be ready to take the additional weight if the chimney has to be extended. In other cases the chimney had had to be re-sited away from the front of the building.—*James Goodfellow, Chief Sanitary and Chief Smoke Inspector, City of Leeds.*

The Testing of Domestic Fuel Burning Appliances

DURING the past three or four years the Fuel Research Station of the Department of Scientific and Industrial Research has extended considerably its facilities for testing domestic appliances for space-heating, cooking and water heating, particularly those designed for burning solid fuel.

In collaboration with other testing laboratories, appliance makers, and interested Government Departments, methods of testing have been selected and standards of performance for the various types of appliance have been

drawn up. The tests are designed to provide information on efficiency and suitability under ordinary conditions of use in the home. Heat outputs for water heating and room heating are measured and efficiencies are determined at various rates and under different conditions of use. With cookers the effectiveness of the oven is assessed by cooking selected dishes, and the performance of the hot plate is determined by boiling tests.

In addition to the scientific measurements, each appliance is critically

examined in detail with particular reference to easy cleaning and maintenance, simple operation, and convenience to the housewife. Appearance is regarded as important, and by arrangement with the Council of Industrial Design, a panel of designers comments on each appliance.

Close collaboration is maintained with the makers of the appliances during the tests. The makers are invited to inspect the installation before testing is begun, and to visit the Fuel Research Station during the course of the tests. This close collaboration has resulted in many improvements, some of them quite important, being made to the design and performance of a number of the appliances.

Those solid fuel appliances which reach the required standards and fall within suitable price limits are included in the Approved List of Appliances for Low Cost Housing, drawn up by the Ministry of Fuel and Power in co-operation with other Government

Departments; the list is circulated to Local Authorities.

In order to qualify for inclusion in the Approved List, appliances must have an efficiency much greater than those in general use before the war. They burn fuel much more efficiently and generally make it possible to achieve much improved standards of heating in the home at a reasonable cost and with a reasonable fuel consumption. One significant feature is that a large number of these modern appliances—open fires of various types, openable stoves, cookers, and combination grates—are suitable for use with smokeless solid fuels. Many of them are more efficient with the smokeless fuels than with bituminous coal.

Arrangements have been made to extend this work by the establishment of a Fuel Research out-station in Scotland, where a large proportion of the solid fuel appliances are manufactured.—*The Fuel Research Station.*

Smoke Prevention Device for Industrial Boilers

AT the Annual Conference of the Society held in Edinburgh last year Mr. T. F. Hurley of the Fuel Research Station of the Department of Scientific and Industrial Research gave a paper on "The Composition of Smoke." In this paper it was mentioned that during the war the smoke from merchant ships had been reduced or eliminated by the use of devices developed at the Fuel Research Station, and that after the war the same principles had been applied on land to hand-fired natural-draught shell type boilers, such as the Lancashire boiler.

The device* when used in this application takes the form of a special firing door. In the upper part of the

door are two large nozzles with streamlined entry for the admission of a continuous supply of secondary air, and in the lower part is a large flap valve which opens automatically when the firing door is opened and admits the extra air required to eliminate smoke immediately after raking or firing. The valve is closed after a few minutes when the evolution of volatile matter from the coal has abated.

During the last year further tests have been carried out at the Research Station with various types and sizes of fuels and over a range of boiler loads; and the device was shown to be satisfactory under all the conditions tried.

Every opportunity has been taken to make the doors better known. At the time of the last Conference they had already been described in various technical journals, and lectures and

* "A Smoke Eliminator for natural draught Lancashire Boilers" by T. F. Hurley, *Fuel Economy Review*, 1946. "Recent Advances in Smoke Abatement based on the work of the Fuel Research Station" by T. F. Hurley. "Institute of Fuel," August, 1947.

demonstrations had been given to numerous individuals and organisations. Nevertheless there were only a few in commercial use, and it was suggested at the Conference that the smoke eliminator doors should be given increased publicity. Since then the earlier methods of publicity have been continued and others have been tried.

In January, 1948, the doors were mentioned in the first of the series of broadcasts known as "Progress Report." As the direct result of this broadcast a large number of enquiries was received.

A full-scale model of the door has been exhibited at three Engineering Exhibitions, at each of which a member of the Station staff was present to give

full information. The exhibits aroused considerable interest and were freely and favourably commented upon in the Press.

Two firms have recently arranged to make and to advertise the firing door commercially, and other firms are seriously considering undertaking its manufacture. Although only a few have been fitted the reports received up to date are encouraging.

The device has not been patented and it can be manufactured without royalty or other fees by anyone. The Director of Fuel Research will be pleased to give every possible assistance to any who may wish to use the doors or to make them either for their own use or for sale.—*The Fuel Research Station.*

Bristol Smoke Control Committee

FOR many years Health Departments have been trying to secure a cleaner atmosphere by the *abatement* of smoke and grit nuisances, but it is now realized that a new approach by means of *prevention* is required if new plants are not to be adding their quota of pollution to that produced by existing offenders.

With a growing realization of the measures necessary to secure this desired result the Bristol Health Committee convened a meeting during 1946 when the Chairman and officers of the Planning and Reconstruction, Housing, and Health Committees were invited to be present. The Chairman (Alderman J. J. Milton) welcomed the Secretary of the National Smoke Abatement Society who referred to the unique nature of the meeting which was also attended by the Town Clerk, Medical Officer of Health, City Engineer, City Architect, City Valuer, Housing Manager, Public Analyst, and the Chief Sanitary Inspector with his Deputy.

A wide range of methods which if adopted would have an influence in producing a cleaner atmosphere were discussed including District Heating, Communal power schemes for trading

estates, new domestic heating appliances and the creation of a smokeless zone.

Following a report to the Health Committee on the interest created by the inaugural meeting it was decided to establish a *Bristol Smoke Control Committee* consisting of three members of the Planning and Reconstruction, Housing, and Health Committees with the principal officers concerned. The importance of smoke prevention in reconstruction and new housing schemes has since been fully discussed by the various committees with representatives of the Smoke Control Committee. This has resulted in special consideration being given to cleaner methods of heating when plans are submitted and to the installation of multi-fuel and smokeless grates in all new houses built by the Corporation.

This co-operation was also evident when, following the submission of plans to reconstruct a local gas works it was decided to invite the Chief Sanitary Inspector to accompany a deputation to the Torquay Gas Works so that the Council members and officers could see methods of gas production under the most cleanly conditions.

The Bristol Smoke Control Com-

mittee considered the new legislation proposals of the National Smoke Abatement Society. The Bristol City Council nominated the chairman of the Health Committee (Alderman J. J. Milton, J.P.) to serve on a special Committee set up by the Association of Municipal Corporations, to receive the views of representative local authorities, and following full discussions in each case, decisions were made to support these proposals in principle.

Thus it will be seen that the active interest of a team inspired with a desire to pursue new methods has been established not only to see what can be

done at the present time, but also to consider the most satisfactory administration of any new legislation.

A further indication that those interested with new construction are conscious of this important matter is evident by the presence at this conference of Mr. J. Nelson Meredith, the Bristol City Architect, whilst the Chief Sanitary Inspector has been invited to address a meeting of the Faculty of Architects in the Western Region on the part which can be played by private and public architects in connection with this matter in the future.—*F. J. Redstone, Chief Sanitary Inspector, City of Bristol.*

Dust Nuisance from Cement Works

THAMES-SIDE AREA

IT will be remembered that at the Conference of the Society held in October last the question of the dust nuisance from Cement Works in the Thames-side area was brought before the Conference, and mention was made that a Conference of Local Authorities and other bodies interested in the matter was being held at Dartford towards the end of the month.

The Society was represented at that Conference and it will be observed from the 18th Annual Report that a Representative Investigation Committee was set up. The Investigation Committee has held a number of meetings.

At one of the meetings representatives of the cement industry, the Chief Inspector of Alkali, etc. Works, Ministry of Health, as well as the Deputy Chief Inspector and a representative of the Ministry of Works, attended, when the representatives of the cement industry stated that they could reduce the dust nuisance very considerably if they could obtain dust extraction plant required at the factories, but that due to the economic position, particularly in regard to allocation of steel, they were unable to obtain delivery of plant required.

Representations have been made to

the Minister of Health through the local Members of Parliament, and a communication recently received from the Parliamentary Secretary to the Ministry of Health stated that the Minister had been in communication with the Supply Ministry who were making enquiries into the manufacturing position of dust arresting plant and that while these enquiries were not yet complete, it was learned that the plant required for one of the works on the Kent side of the Thames would be ready in July, and that extensive renovations were being undertaken at a second works which should be completed by the end of November.

The Member of Parliament for West Thurrock was successful in raising the question on May 7th on an adjournment of the House of Commons, when a promise was made by the Parliamentary Secretary to the Ministry of Health that he would certainly do all he could to push forward the production of precipitation plant.

The Members of Parliament urged that the Minister should view for himself the effects of cement dust in the area.

The Investigation Committee, after consultation with Dr. A. R. Meetham,

have arranged to collect evidence and statistics by the use of Petri-dishes of the amount of dust falling in the area, such dishes to be placed on sites suggested by Dr. Meetham, on approximately sixty different sites, and that at least sixteen tests should be taken.

Dr. Meetham then suggested that the County Analyst should be asked to analyze each sample, giving information as to :

- (1) the weight of each sample with the name of site and the date.
- (2) the combined samples of one day to be analyzed for calcium determination.
- (3) heavy samples only to be analyzed.

At the end of June four tests had been taken by means of the Petri-dishes, but at the time of writing there is no report from the County Analyst as to the interpretation which can be placed upon the tests.

Petitions against the dust nuisance have been organized by a number of Local Authorities in their respective areas, and more than 4,500 signatures have been obtained urging that all possible steps be taken to abate the nuisance from cement dust arising in

the respective districts.

Communications have also been addressed to the local branches of the National Farmers' Union to ascertain whether any claims had been made in respect of loss sustained by Fruit Growers as the result of the deposit of dust upon the fruit and other vegetable produce grown in the area.

While the Committee have received evidence that growers did suffer a loss through the cement dust owing to crops looking shabby and requiring additional washing to make them fit for market, no evidence has been obtained showing the actual cash loss per acre.

The collection of evidence is making rather slow progress and the result of the Committee's investigations are not yet complete. The recent unsettled weather has prevented further tests being taken by means of the Petri dishes, and it is this evidence which is most important to the Committee before they can prepare the final report. It may be that by the time the Conference is held in October next, the work of the Committee will be completed and a full report can be submitted.—O. James, Hon. Secretary, Investigation Committee, Clerk to the Council, Rural District Council of Dartford.

Central and District Heating Schemes

PROGRESS on these schemes has been steady, and a number of Central Heating Schemes have been accepted by various Councils and Ministries concerned. The London County Council have at least six schemes of Central Heating in progress to large blocks of flats ; Holborn, Paddington, Edinburgh and Glasgow are also moving on these lines. The Paddington scheme is a large one, the first section comprising 900 flats, most of these in ten storey blocks, and one of the Glasgow schemes also propose a ten storey block, and central heating is proposed.

On the schemes covering larger areas (though not necessarily a greater number of dwellings), a special com-

mittee of the various Ministries has been set up to consider District Heating, and so far has approved of a number of schemes in England.

These are as follows :

	No. of Houses
Bilston	350
Brynmawr	838
Coventry	
Dagenham	850
Hounslow	345
Luton	1,750
Pimlico	1,690
Salisbury	522
Twickenham	900
Urmston	1,317
Wythenshawe	7,585

Swindon is also considering a scheme for about 1,100 houses.

In Scotland a scheme is in progress at Bonnyrigg and a commencement has also been made on a District Heating scheme to the first section of a new town at East Kilbride, which it is expected eventually to comprise 10,000 dwellings and all public buildings in the area. Two other schemes in Scotland under consideration are at Pristhill, 560 flats, and Woodside, Fife, 340 houses.

Most of the above schemes are purely Thermal Schemes, but Coventry, Pimlico and Wythenshawe schemes are

Thermal Electric while possibly Luton and Swindon, if adopted, though thermal schemes in the initial stages, will ultimately become linked with Power Stations.

Of the schemes mentioned those on which construction has actually begun are Urmston, Salisbury and Pimlico, and on the former of these three the first 100 houses are already connected up and working.

It is hoped by the time this report is presented to the Conference, some further interesting data about some of these schemes will be available.—
Donald V. H. Smith.

The Salford Corporation Act

A noteworthy feature has been the emergence of powers designed to implement the Society's policy for the progressive elimination of smoke. The bill, now the Salford Corporation Act, takes its place on the Statute Book but not without occasioning alarm for its safe passage at times.

Three sections deal with smoke abatement :

- (1) Gives power to control the heights of industrial chimneys.
- (2) To secure the application of the principle of prior approval to all proposed new furnaces.
- (3) To establish "smokeless zones."

Very little opposition was presented to item No. 1. Under the second heading the original Bill was designed to give control over all types of heating appliances but it was deemed politic to be satisfied with similar powers to those contained in the Manchester Act. The opposition to our attempt to extend control was keen and obviously gaining favour with members of the Lords Committee. To operate this section an advisory panel of experts on which the Health Committee, the Building and Development Committee, and the Ministry of Fuel and Power (Fuel Economy Section) are represented has been constituted.

Opposition to the "Smokeless Zone" proposals was no more than

anticipated and thanks to the use of arguments developed by the Society and constant quotation of "Simon Report" recommendations the clause was admitted without alteration, but it should be noted that "Smokeless Zone" declarations are subject to approval by the Minister of Health and liable to Local Enquiry.

A further forward step has been taken. After tentative enquiries and being satisfied about the availability of smokeless fuels locally the three-stage project was explained to a meeting of the local merchants operating in the City and, commencing with a degree of antagonism on their part, they were satisfied that they had, by having a preview of the projected design, a reasonable opportunity of catering for, and cultivating a greater demand for smokeless fuels. Certain difficulties, not entirely unknown to us, were referred to and grievances ventilated. Illustrative of the spirit of co-operation engendered by the meeting is their proposal for a further discussion with the promoters of the scheme, the local coke producers, the Fuel Overseer and their own representatives for the purpose of ironing out the difficulties and further their expressed willingness to exhibit smoke abatement posters in their offices, particularly if the posters advocated the use of readily obtained

smokeless fuels.

Easement in the staff situation has permitted a partial resumption of the pre-war observations of industrial smoke emission and a survey of an area covering approximately one third of the City. It led to the discovery of three cases of overloading. In one of them, a laundry, an old vertical boiler is being replaced by a 31 ft. Lancashire boiler; in another, a brewery, the installation of economizers is advocated, whilst in the third, another laundry, the Lancashire boilers, incapable of being operated at high pressures through excessive wear and tear, are being replaced by new ones and the flues and settings overhauled. Other items of modernization will probably be carried out at the same time. The boiler house visits revealed a feature to which attention was directed on several occasions. Stokers, in their endeavour to counteract the high ash content and clinkering effect of low grade coal, are inclined to remove too much partially consumed fuel, sometimes to the extent of completely emptying the furnace. Apart from wasting coal it gives rise to the creation of volumes of dense black smoke, and the practice is much to be deplored.

Grit emission nuisances have increased considerably. The usual cause is a very high draught, often higher than necessary. Such cases are easily

rectified, but in one case, that of a dyeing and bleaching works, nothing short of high expenditure on cyclonic grit arrestors, for which there was no space available, had to be advised. The firm was persuaded to take a long term view and decided instead to construct a new power-plant incorporating water-tube boilers and other modern equipment. The work is well in hand and will be a distinct improvement in an area already zoned for residential purposes.

On the whole, there is a noticeable improvement in the quality of coal supplied to industrial boiler-plant and the Ministry of Fuel and Power are to be complimented for their endeavours in this direction whenever occasion has demanded their attention being directed to a particular case, but many firms need to be reminded that coke is a very suitable fuel for use in vertical boilers.

The practice of making domestic coke available to tenants of all new houses equipped with "approved" appliances continues and undoubtedly more success could be achieved in ensuring the continued use of this fuel were time and staff not such important factors, but in any case that problem will eventually be solved when the "Smokeless Zones" come into being and the delivery and use of bituminous coal is prohibited.—*J. L. Burn, Medical Officer of Health, Salford.*

Joint Discussion on the Survey and the Progress Reports

Dr. R. Lessing (London) said that at the last Conference held in the West Country, at Bristol in 1935, he had concluded a paper on "The Sources of Atmospheric Pollution" with a proposal for instituting a survey of the contributory causes of this evil. At long last a modest beginning had been made. As Chairman of the Technical Committee he wished to express the Society's appreciation to Col. Cousin for the pains he had taken to perform

a somewhat thankless task. The response to the inquiry was excellent in some, inadequate in others, and was not forthcoming at all in far too many cases. Col. Cousin had to cut his coat according to the diversified material at his disposal and this resulted in a garment of many colours and tattered in parts. The Society looked to those authorities who had tackled the job in earnest, to give their assistance by continuing their watchfulness and to

report the effects of the Society's good work in their areas. Eventually the survey would have to be intensified on the one hand by testing the air for polluting matter, and on the other by tracing the offending chimney emission to its original source, the combustion appliance and its fuel.

One point in the report should be stressed. Putting the blame on inferior fuel was not justifiable as a generalization. Dr. Lessing's record cleared him of any accusation of being an apologist for dirty coal. He could therefore say in good conscience that high ash in coal, however indefensible technically and economically, did not promote smoke formation. But, and a very grave but, the natural dust in coal was most objectionable and was indeed one of the major sources of atmospheric pollution, being almost entirely responsible for the emission of grit and flue dust.

If dust, as distinct from "fines," which were much coarser, were extracted from all coal before cleaning or even from coal not to be cleaned owing to the present inadequacy of preparation plant, it could be burned without loss in pulverized fuel furnaces. This would entail the efficient utilization of several million tons of a portion of the coal which now escaped unburned or only partially burned, to create the appalling nuisance which we wished to eradicate.

D. C. Cross (Institution of Gas Engineers and National Coke Federation) said he proposed to confine his remarks to the paragraph on grit pollution from gas works. He agreed there was little remedy for smoke and dust from horizontal retort houses, but pointed out that 56 per cent. of the gas manufactured in gas works now came from vertical retort houses, where it was practical to eliminate most of the smoke and dust in the retort house.

In several gas works, a system of vacuum fans had been installed which successfully trapped the coke dust during extraction of coke from retorts, as this was the chief source of grit. He did not agree with the statement that there was no remedy for grit in the

blast from water gas plants. He could state from his own experience that it was possible to install grit catchers or arresters on the top of water gas stacks which were very efficient in stopping the discharge of grit. Many of the water gas plants in the country were fitted with these grit catchers and were working satisfactorily. He had installed with success a grit catcher on the top of a steel chimney attached to a battery of Lancashire boilers burning only fine coke breeze and using forced draught. This is a severe test on the efficiency of these grit catchers, and he was proposing to extend the system to all steel boiler chimneys.

Another source of dust arising from gas works or any other works where a mechanical coal wagon tipper was in use—he had observed a cloud of coal dust every time a wagon was tipped. As his works had a food factory adjoining the retort house, steps had to be taken to eliminate this coal dust, and a successful remedy had been found by installing a system of 60 fine water sprays around the receiving hopper which created a fine blanket of water spray over the coal when it was tipped and had trapped any coal dust arising.

He finally wished to refer to the high price of coke in some areas of England, which was perhaps out of step compared with the present price of gas or even coal.

During the war it was the policy of the Government to stabilize the price of gas and encourage gas undertakings to place the additional cost of production on coke. There is no questioning the fact that the price of coke has risen at a much higher percentage than the price of gas, and this has been recognized by the fact that in the last increase in price of coal, many gas undertakings did not increase the price of coke but raised the price of gas to meet the increased cost of production.

He felt that if the gas industry had more freedom of control of the price of gas and coke, then the price of coke would in time be adjusted to its economic comparable value.

James Law (Sheffield, Rotherham, and District Smoke Abatement Com-

mittee) said he was very pleased to have the opportunity of expressing his grateful thanks to the Society for their enterprise and initiative in attempting to record a survey of the atmospheric conditions throughout Great Britain. It was the most illuminating piece of work that had been attempted during the past thirty years and should give every delegate at the Conference food for very serious thought.

Last year at Edinburgh he had stated that it was with a feeling of frustration regarding the lack of progress made in other areas that made him wonder if we were serious with regard to smoke abatement? He criticized the existing Regional Committees and their work.

This survey had shown very definitely that the apathy and lack of interest was more widespread than any of them had thought possible.

In England only 47 per cent. of the local authorities thought it necessary to reply and of that number a further 10 per cent. were of opinion that there was no atmospheric pollution problem to consider so that only about *one third of the population of England* was smoke conscious.

In Scotland 31 per cent. of the local authorities replied and 7 per cent. had no problem so that smoke consciousness in the north was only 25 per cent.

These were inferences that must be accepted and faced up to if smoke abatement was going to become something more than a toy or a plaything for people when they hadn't much to occupy their minds.

The pollution of the atmosphere was a continuous process: it went on day and night throughout the years and if it was to be controlled the methods must also be continuous, not at a Conference once a year, which one forgot about until the next Conference.

If a survey was made of the number of Inspectors who are doing smoke abatement work as a full-time occupation it would be found that the total number was only twenty-five.

With regard to standards of assessment, if there were no instruments in operation to give records of what was

happening, they were only making a poor guess and that was apparently what was being done by more than half the local authorities in this country. Pollution recording gauges were not expensive, they didn't require an amount of daily attention, but they did give an indication of the conditions of the atmosphere. They were not to continue guessing, but to make some records to show what is happening.

Much discussion had taken place with regard to fuel supplies and as an excuse an amount of careless stoking and bad appliances had been attributed to the fuel supplied. A census of the Sheffield area in 1946 showed that in the majority of cases, the fuel was as good if not better than that used in 1938. If the boiler plant was adequate to take the load imposed and the appliances were good, the quality of the fuel was not of paramount importance. Greater discrimination however was necessary that at present, for the use of ungraded slack with sprinkler stokers was certain to cause grit emission. The indiscriminate use of forced draught had the same effect.

Here he would also offer some criticism to the Ministry of Fuel and Power with regard to fuel supplies. Sir Stafford Cripps was asking for an increase of at least ten per cent. in the output of manufactured goods for export. Mr. Gaitskell was insisting on a ten per cent. degrading of all fuel supplies for manufacture in order that the graded fuels could be used for export. How could manufacturers increase their output to any extent with a lower grade fuel? This was a serious matter that needed adjusting. As smoke abatement officers, the indiscriminate use of ungraded fuel and forced draught was becoming a menace and was not in the interests of the manufacturer or the community. If they had any doubts about this matter they were to watch the increase in the pollution deposits in the industrial areas.

Had the survey been worth while? It had shown up the apathy of many, the ignorance of some and the necessity for much greater efforts on the part of

the local authorities, manufacturers and technical officers to control and prevent the increase of pollution which was taking place throughout the country.

Dr. A. R. Meetham (Fuel Research Station of the D.S.I.R.) agreed that it was important, where possible, to measure the atmospheric pollution in districts before industrial or domestic development took place. Measurements of that kind were already being made in a number of places including Stevenage, where a new town was being built.

There was reason to be pleased with the results of the tests which had so far been made by the Investigation Committee of local authorities in the Thames-side area. This was the first time petri dishes had been extensively used for rapid surveys of the deposition of dust in the neighbourhood of cement works, and the surveys were yielding reproducible and intelligible results.

Mr. Marsh had mentioned deposits of 3-4 tons per day on a square mile in this area. In the nearby industrial district of East Greenwich in the same period, the deposits were only 1-2 tons per square mile per day, and in the remoter parts of the Thames-side area surveyed, deposits of less than $\frac{1}{2}$ ton per square mile per day were common. There were signs, however, that since April, 1948, the deposit near the cement works had diminished appreciably. Was this due to a reduction in the dust emissions from the cement works?

The percentage of calcium in the heavier deposits collected at Thames-side was usually 20-30 per cent., whereas pure cement-works dust contained about 40 per cent. of calcium or perhaps more. The inference must be that some of the dust collected was not from cement works.

Dr. Meetham pointed out that observations with petri dishes were not made in average weather conditions but in periods of dry, fairly calm, weather. They could not be used instead of deposit gauges for measuring the average rate of deposit, and experience had proved that petri dishes tended to give results about $1\frac{1}{2}$ times as much as the insoluble matter collected in deposit

gauges.

W. A. Damon (Chief Alkali Inspector, Ministry of Health) referring to the Thames-side Cement Works, said that the demand for cement had risen from two million tons in 1921 to eight million tons in 1939. From 1935, when it was established that electrical precipitation was a practicable means for dealing with cement kiln gases until 1939 a large number of such plants were installed. With the outbreak of war the demand for cement fell and a number of plants were laid idle. At the cessation of hostilities it became necessary to step up production again rather violently and it was then found that most of the electrical precipitation plants had suffered so much corrosion as to be virtually unworkable. The cement companies had done their best to restore conditions but were severely hampered by shortages of steel plate and electrical equipment. Supplies were, however, now coming in slowly but steadily and good progress had been made in the past twelve months.

Equally with the emission of dust via kiln chimneys, that from ancillary processes such as grinding, transportation and bagging of cement could be a serious factor in local pollution. This matter was not being overlooked. At least one complete bag filtering unit had been installed, three more were in process of installation and quite a number were on order.

There had been a definite improvement in conditions during the past twelve months and equally definitely there would be a further improvement in the next twelve months but it was necessary to sound a note of warning. About half of the total cement production of this country was concentrated in the Dartford-Grays-Gravesend area and he feared that so long as this huge production continued in such a limited area—even when everything had been done that could be done—the irreducible minimum of dust emission would still be such as to cause complaint.

Councillor John Duffus (Bexley) thanked the Secretary—Mr. Arnold Marsh, Dr. Meetham, and the Technical

Committee of the Society, for the help given to the Thames-side Cement Dust Investigation Committee.

Speaking on behalf of the Committee, he was pleased to report that the cement manufacturers had agreed to install electrostatic precipitators in all their factories, and when installed, 95 per cent. of the nuisance would be eliminated. It was rather unfortunate that this agreement had been reached during a steel shortage ; these firms had plenty of opportunity to install pre-war when there was no shortage of steel. However, better late than never.

The Executive was asked to support the application for steel to construct the electrostatic precipitators.

The full case would soon be ready to present to the local M.P.'s and despite the Chief Alkali Inspector's rather pessimistic report, the Committee felt sure that the Minister of Health would give favourable consideration to the appeal for steel.

G. Nonhebel said that he was speaking as a private member although he was connected with industry. He proposed to confine his remarks to the view point of the designer and manager of plant.

He referred to the conference held at Leeds on "Dust in Industry" and said that the emphasis there during the discussions on plant performance was on measurement of concentration and particle size and stressed the importance of the expression of performance in quantitative terms. He referred to recent local acts containing smoke abatement provisions and pointed out that the relevant sections provided only that furnaces were to be as far as practicable capable of being operated continuously without emitting smoke. There was, however, no definition of smoke so that on a strict interpretation even a thin haze coming from a chimney could be called smoke.

He suggested that members should think about more precise definition of industrial smoke and reminded them of the paper read at last year's conference by Mr. Hurley of the Fuel Research Station which showed that with certain types of boilers the lowest

loss of heat in chimney emissions was when there was a light grey smoke as measured with an optical device. Here was a suggestion for guidance on measurement in quantitative terms which could, with suitable instruments, be measured and recorded.

If bad smoke were defined as slightly worse than that which had been shown to give the highest efficiency of operation that would be something managers of plants could understand and if instruments could be installed managements could then see that their plants were complying with the regulations in force.

If some positive figures could be put forward as to what were considered reasonably good conditions in industrial districts designers of plant would have a better idea of the standard to which they should design.

John Roberts (Cheltenham) drew attention to a paragraph on page 18 referring to grit from coke ovens. It seemed to him extraordinary that the local authority were being pressed to erect aluminium pre-fabs close to a battery of coke ovens where it was said that nuisance arose from grit. It was simply asking for trouble to erect the pre-fabs there. In his view, smoke abatement was not everything ; industry came first. One must earn one's bread first, and then seek a place to eat it more or less in comfort. Besides, the coke oven industry was a smoke abatement industry.

Mr. Roberts then went on to describe an example of wasteful combustion of smoky coal in a well-known hotel in that town. His object in so doing was to stress the fact that if the raw coal were first treated in, say, the Mansfield retorts to eliminate 25 per cent. of volatile matter, the remaining 75 units of smokeless fuel would radiate more heat into a room than would the 100 units of raw coal.

J. Price Walters (Ministry of Fuel and Power) made a plea on behalf of the Engineers of Hospitals and Institutions and stated that he welcomed this opportunity of emphasising their importance to representatives of local authorities. It not infrequently hap-

pened that, when a Ministry Engineer visited an Institution at the request of an Administrative Officer, he found that most of the recommendations he had to make had already been made previously by the Engineer, only to be turned down on grounds of cost, without the consideration the suggestions deserved. He felt that the raising of the status of the Hospital and Institution Engineers would encourage well qualified men to apply for these posts, with great advantage to the local authorities concerned.

Mr. Price Walters then referred to the contribution by Councillor Young (Gateshead) and stated that he was very interested to learn that tenants of all-electric houses had expressed the view that the amenities more than compensated for the absence of the "cheery open fire." He considered that this augured well for the whole house heating demonstration about to be conducted by the Ministry in various parts of the country, one of the objects of which is to ascertain whether British tenants will appreciate the amenities thereby provided and prefer them in spite of the absence of an open fire. Unfortunately, there would not be a demonstration in Gateshead but he invited Councillor Young to keep in touch with the Ministry's Regional Office in Newcastle, so that he could visit the demonstration at Doncaster as soon as the houses were complete and tenanted.

Councillor W. P. Stagg (Thurrock, Essex, U.D.C.) stated he was from the Thames-side cement producing area; such district comprised 40,000 acres and a population of 74,000. Conference had heard Dr. Meetham on the results of the investigations made so far at the instigation of the joint body representing the local authorities on the Kent and Essex sides of the Thames cement producing area. Conference had also listened to his friend Councillor Duffus of Bexley on this nuisance and he did not therefore desire to stress the matter again from that angle. He did however desire to express what in his opinion was necessary to ensure a limitation of smoke and

grit nuisances.

Councillor Stagg then went on to state that it was his opinion that appointments as Smoke and Grit Inspectors in each area were necessary and their duties should comprise the work of the Alkali Inspectors and possibly the Factory Inspectors so that complete supervision of factories was undertaken. Conference knew only too well that an efficiency of 95 per cent. could be obtained by the use of electrical precipitators but a minimum of 80 per cent. for the time being might be satisfactory until the supplies position became more easy.

The salaries of such inspectors should be borne by the Ministry of Health, the prime duty of that department being the health of the nation; in fact the cost might be reimbursed to that body by the saving of doctors' salaries. Reports upon all factories in the area would be made by such Inspectors, in the first case to the local authority, and periodical reports made to the Ministry.

Councillor A. Stewart (Corby) considered there would have been a much better response to the national survey, if the forms had been sent to the responsible official, that is the Sanitary Inspector.

Regarding the Progress Reports, and the statement at the general meeting that the Society had approached the British Electricity Authority, he suggested that they should now approach the Iron and Steel Federation.

Deposit gauges had been set up in Corby in May, 1948. In three out of the following four months, the records were the highest published in Great Britain; in the remaining month, they were only beaten by Wellingborough. No other district came near those results. The deposits recorded in the four months were (in tons/sq. mile) 111.69, 79.47, 73.77, 90.19. Certainly Corby, and probably Wellingborough, did not like being top of the pollution league!

Now, Corby had no legal powers, but could only use persuasion. Even if they went "cap in hand" to the works, and thereby reduced the figures by, say, 50 per cent., even then the deposits

would be considerably higher than most places.

F. W. Brick (Publicity Officer, Coal Utilization Joint Council) pointed out that the erection of all-electric and all-gas houses (suggested by Mr. Young, of Gateshead), did not offer a practical solution to the problem of domestic smoke pollution, since 80 per cent. of the total domestic heating load was taken by solid fuel. The ultimate solution, he suggested, depended upon the installation in all new houses now being erected of improved appliances which burned bituminous coal more efficiently than pre-war types and which could burn solid smokeless fuels when these are more freely available than they are to-day.

Mr. Brick said that many local authorities were still installing inefficient appliances of pre-war design, and in general they advanced one of three reasons for this: (1) The long delay in delivery of the improved appliances, (2) that the extra capital cost of the improved appliances would bring the price of the houses above the ceiling permitted by the Ministry of Health, and (3) that they could not afford the extra capital cost involved.

Dealing with the first point, Mr. Brick said that the production of improved appliances was now ample for all new housing and that if the local authorities placed their orders when the plans were passed and did not wait until houses were in course of erection, they would receive the appliances in ample time for their requirements. With regard to the second point, he said that on the 20th April, 1948, following representations by the Coal Utilization Joint Council, the Ministry of Health had issued a circular to local authorities (No. 61/48), which stated:

"The Minister attaches great importance to the extended use of efficient modern solid fuel appliances and will take into account any additional cost involved when he considers tenders submitted for approval."

On the question of the extra capital cost involved, Mr. Brick said that a fuel saving of £1 5s. 0d. a year justified

an extra capital cost of £10 assuming that the life of the appliance would be only ten years—and the life was more likely to be 30 or 40 years. He thought that if given the opportunity, tenants of houses would willingly pay an extra sixpence a week on their rent in order to have the benefits which the new appliances offered—improved performance, saving in labour and in cleaning, and reduced fuel costs.

Mr. Brick concluded with an appeal to the Society to concentrate all its resources on the task of persuading local authorities to install the latest improved solid fuel appliances in their new houses. He said there could be no ultimate solution of the domestic smoke problem so long as new houses continued to be installed with old-type appliances which would probably still be there in thirty or forty years' time.

Dr. Greenwood Wilson (Cardiff) began by saying that he welcomed the opportunity of paying public tribute to the pioneer work of Mr. Donald V. Smith in the cause of district heating. He regretted that that work had not been followed up very vigorously throughout the country, particularly at a time when with such vast building programmes, there should have been so many opportunities of including district heating schemes in the new Council Housing Estates. It seemed not to be generally understood that although such schemes would put up the rent perhaps five or six shillings per week, this would be more than offset by the saving of fuel (coal, electric or gas) and by the incalculable advantages to health and comfort that are brought to the homes of the people by district heating. He stressed the greatness of the boon to health, cleanliness and happiness of housewife and family conferred by constant hot water—one of the advantages of district heating schemes.

He also pointed out that with the central heating systems in each house, that it was possible to associate with district heating schemes, they could have here, as on the Continent, a healthier and happier use of each home. Instead of the family in winter time

having to crowd round the one source of warmth in the living room, distracted by the varying pursuits followed by individual members of the family, they could use to the full every room in the house including the bedrooms. For example, children could do their home work in their bedrooms in peace, whilst other members of the family downstairs could enjoy the wireless without feeling that in so doing they were distracting those members of the family who needed quiet for home work, reading, etc. Dr. Greenwood Wilson concluded by urging that the National Smoke Abatement Society should bring all pressure to bear on Central and Local Housing Authorities to speed up the provision of district heating schemes throughout the country.

James Law replying to the discussion said that as a number of technical questions had been asked during the discussion it appeared that in fairness to the questioners, some suitable replies should be made. Mr. Nonhebel asked about smoke "in such quantity as to be a nuisance" which was not a simple matter.

"Smoke is a nuisance when it becomes opaque on leaving the chimney top—irrespective of the colour—the 'Time Standard' varies, but in most cases must not exceed two minutes during any observation of 30 minutes' duration." Grit was not so easy and must be collected on grit slides or petri dishes and proof given that it came from a specified chimney. Though the size of the grit particles were important and resolutions had been put with regard to size and quantity, the British Standards Institution had not been able to give a definite specification with regard to this matter. Prosecutions had taken place for excessive grit emission, which was a growing menace and the use of inferior low grade fuels is increasing the amount of deposited matter daily.

Mr. Max Young asked similar

questions to which he hoped this reply would be satisfactory.

Mr. John Roberts stated that coke ovens were large contributors to smoke abatement on account of the coke they produce, but he did not inform them about the nuisance caused to residents in the vicinity of those coke ovens, both from "green gas" and sulphur-laden vapour from quenching. The amount of nuisance caused in this manner could be much worse than factory chimneys in an industrial town.

Mr. Ellis of Bermondsey had complained of ships in dock and wondered who was responsible for the nuisance caused. The local authority in which the dock was situated was directly responsible for this smoke nuisance and the Public Health (London) Act 1936, Section 3, gives them power to deal with such nuisance. In Liverpool very stringent action used to be taken to control smoke from shipping which could become a serious nuisance if efforts were not made to control it.

Mr. Stewart of Corby had stated that his authority had the highest pollution records in Great Britain but this was not strictly correct as Scunthorpe in Lincolnshire showed higher records. In both these towns as well as Wellingborough, blast furnaces and Bessemer Converters were in continuous operation and as these were basic industries and the impurity from the material was blown into the atmosphere, the nuisance was serious and should be controlled. Electrostatic precipitation would hold a considerable amount of the deposit if the users would go to the expense of installing such apparatus. Failing this action, it was possible that the people who lived in the vicinity of these works could take civil action and ask for an injunction against these people for material damage. This had been done in Sheffield with satisfactory results, the offenders having been compelled to install suitable apparatus to collect the dust.

SMOKE ABOLITION AND THE PUBLIC :

PROBLEMS OF EDUCATION AND PROPAGANDA

By LESLIE HARDERN

I THINK we would all agree that we shall never achieve the aim of the National Smoke Abatement Society—the complete abolition of smoke in Great Britain—until we have created an active public opinion in its support. I stress the word active because there is plenty of passive lukewarm support, but that does not get us anywhere. There is also a certain amount of passive resistance on the part of those who would have to spend money making changes to their fuel burning equipment.

Our problem is how to fan this passive support into popular enthusiasm and how to overcome this passive resistance. Once we have reached that point the Government Departments and local authorities will have no difficulty in passing the necessary legislation and by-laws, the manufacturers will be able to produce the right appliances, the firemen and stokers can be taught to operate them properly, and the inspectors will be able to supervise their operation.

Education and persuasion of the public to-day on any issue can be achieved more rapidly than ever before in history. The task of achieving it, however, has become much more complicated and expensive than ever before. It is no longer a question, as when Wilberforce was fighting for the abolition of slavery, of just travelling round the country addressing audiences, publishing and distributing a small number of books and pamphlets, writing articles in a few newspapers with limited circulation, and lobbying Members of Parliament. It involves the use of a very wide range of modern media of propaganda. A full sized

national campaign of this kind is beyond the resources of all but Government Departments, or large and wealthy industries. Smaller concerns, and particularly Associations and Societies like the National Smoke Abatement Society, with limited resources, cannot hope to compete on such a scale, and have to be content with attaining their objects in a much longer period of time. They can, however, shorten this period by a careful study and selection of those propaganda methods which are within their means.

I propose, therefore, to outline in this paper modern propaganda methods, to give some idea of their respective costs, and to make tentative selections of those which, in my opinion, would give the best value to the National Smoke Abatement Society.

Advertising

Advertising can be considered under the headings of (a) Press, (b) Outdoor, (c) Indoor and (d) Direct Mail.

(a) *Press.* Press advertising is the most usual method adopted for directly influencing the public. It covers the national, daily and weekly newspapers, the provincial and local newspapers, magazines and periodicals, trade, technical and professional papers, and a miscellany of annuals, guide books, estate booklets, church magazines, exhibition handbooks, sports' programmes, etc. One medium sized advertisement a week in the majority of these papers costs in normal times at least £150,000 a year.

(b) *Outdoor.* A poster campaign on outdoor hoardings, on railway stations, on the sides of buses, trams, trolley buses and commercial vans, and by the

use of illuminated signs, costs something like £75,000 a year.

(c) *Indoor.* Cinema slides in the majority of the cinemas in the country cost about £20,000 a year in rents, and short advertising films costing about £1,000 each to produce, cost about £25,000 each in rents. Assuming three films a year, the outlay would be £78,000.

(d) *Direct Mail.* A letter or leaflet sent by post to every household once a year runs away with about £65,000.

Publications

A full programme of publications includes booklets, brochures, leaflets, diaries, catalogues and a variety of gadgets. The cost depends, of course, on the number issued, but a reasonable figure for a full year, after allowing for revenue from sales, would be not less than £30,000.

Press

A constant stream of news items and articles is submitted to the national, provincial and local press, magazines and periodicals, the trade, technical and professional papers. Letters to editors are sent at all appropriate opportunities, either providing information or correcting errors. Press conferences are arranged frequently to make announcements of policy and developments; press previews of any displays or exhibitions are held, and publications sent to all suitable papers for review.

A properly staffed press department has officers to deal with the national press, the trade, technical and professional press, and the women's press. These officers not only provide information, but write up articles and submit them for publication. In addition they engage free-lance journalists for special articles. The cost of such a press department would be about £5,000 a year.

B.B.C.

Every opportunity is taken of supplying information to the B.B.C. either in the form of happenings in the Society, for the news announcements, provision of scripts to broadcasters, or

the offer of speakers able and willing to broadcast. This work is handled by the press department mentioned in the previous paragraph.

Platform Publicity

There are numerous opportunities of providing speeches to Rotary Clubs, Chambers of Commerce, professional and technical bodies, women's organisations and political groups, etc., and lectures to schools and educational establishments. Speakers and lecturers are engaged, and three or four can cover a large number of audiences all over the country. The cost of such speakers and lecturers amounts to some £2,500 a year.

National, Regional and Local Conferences are useful methods of bringing a message before a widespread public. Papers, discussions and brains trusts serve the triple purpose of educating those attending the conferences, supplying them with information to pass on to their colleagues and friends, and obtaining press and wireless publicity. It is usually possible, moreover, to make such conferences financially self-supporting.

News Reels

Occasionally events occur, as for example the opening of a new plant, which have an interest to the producers of news-reels and news magazines. As these are shown to millions of people in a single week, they are of great propaganda value. The cost of arranging them can be included in those of the press department.

Film and Film Strips

(a) *Production.* There is an increasing tendency to use films and film strips for educational and informative purposes. Generally speaking documentary films, as distinct from entertainment films, do not find their way into the ordinary cinemas. The most usual channel is non-theatrical distribution to schools, colleges, clubs, associations, churches, etc., where there is an enormous demand.

To do the job properly it is desirable to produce one half-hour film and three

or four short films a year, the longer film costing about £7,000 and the short films £2,000 each, or, say, a production programme of about £15,000 a year.

In addition, there is a widespread demand for film strips and slides especially in schools and colleges. A reasonable series of film strips and slides, with speakers' notes, would cost another £2,000 a year.

On similar lines, it is often desirable to supply recorded talks for those occasions where it is not convenient for a lecturer to travel to the association concerned. The cost is small, say £500 a year.

(b) *Distribution.* It is not sufficient, of course, only to produce films and film strips, slides and records. That is only half the task. A central library has to be established, from which the films may be forwarded to all interested groups. Then, mobile projectors with trained staff, will have to be made available in different parts of the country to give shows to existing and to invited audiences. The cost of a country-wide distribution service would be at least £25,000 a year.

Photographs

A library of photographs of suitable subjects is always valuable for exhibitions, for illustrations for articles in the press, and for the use of free lance journalists. The cost of taking the photographs, prints, and indexing, with staff, would be about £2,500 a year.

Exhibitions

During and since the war exhibitions have become increasingly popular, and numerous. It is possible, in the space of two or three weeks, by means of a first rate stand, to impress a message on the minds of a million people. But the cost of a first rate stand at an exhibition like the Ideal Homes in London can be as much as £10,000. The smallest and least conspicuous space costs £500. To take reasonable space in the leading national and provincial exhibitions calls for an allocation of £30,000 a year.

Travelling exhibitions, either self-

contained in the form of specially equipped vans, or else carried in vans for erecting in suitable halls, are useful for taking the message to the smaller towns and villages. Ten such exhibitions are needed, costing some £10,000, and the running costs, including suitable staff, amount to £5,000 a year.

Displays

There are many opportunities for the use of displays, in local exhibitions, in processions, in civic weeks, etc. Apart from complete displays, there are calls for models, posters, wall sheets, diagrams, etc. to fit in to other schemes and lay-outs. All these have to be made available at convenient centres. Assuming a hundred displays and models, at £30 each, two thousand double crown posters at 2/- each, 20,000 wall sheets and diagrams, at 4/- each, and 100,000 hand-out leaflets at £3 a thousand, the cost, including carriage and maintenance, would be about £8,000 a year.

Information

A central information bureau is essential. It must be well equipped with a library, photographs, statistics and technical data. A lecture hall and film theatre are desirable, but not essential, additions. Excluding these, the cost of the bureau, taking into account rent, rates and staff, is not less than £3,000 a year.

Contacts

To make sure that policy and development are properly understood, either the chief officer or a public relations officer must spend considerable time establishing personal and friendly relations with the leaders of public opinion, and ascertaining their views and criticisms. This involves continuous contact at meetings, receptions, lunches, dinners, etc., with cabinet ministers, prominent members of both Houses of Parliament, senior officials of Government Departments, lobby correspondents, newspaper proprietors, editors and publishers, authors, free-lance journalists, B.B.C. executives, film producers, industrial and commercial leaders, prominent planners,

architects, builders, engineers, surveyors, doctors and many others. These personal contacts must be supplemented and strengthened by wide reading of the press, the professional, technical and trade journals, and by obtaining membership of the associations, societies and clubs in which the leaders of public opinion are interested. These activities involve expenses and entertainment, running up to £1,000 a year.

Opinion Research

To make sure that propaganda is achieving the desired results, a periodic survey of public opinion should be taken in conjunction with a research organisation. This would cost £1,000 a year.

Summary

The total of all these methods of education and research is over £500,000 a year—a sum which is, of course, quite outside the scope of the N.S.A.S. As you know, the amount spent last year on propaganda was about £1,000. The results achieved in the last few years with such tiny means are quite amazing. But we shall have to expand our propaganda very considerably if we are to achieve our aims within our lifetime.

Liaison

One way of reinforcing propaganda is to make full use of natural allies. Every propaganda movement has a number of potential allies, and liaison can be made on the lines of joint or co-ordinated efforts. In the case of this Society, the allies are numerous, including the Solid Smokeless Fuel, Gas and Electricity industries, several Government Departments, such as the Department of Scientific and Industrial Research, the Ministry of Fuel and Power, the Ministry of Health and the Ministry of Town and Country Planning, and a number of national organizations concerned with fuel, health and amenities. Every effort must be made to get their assistance in all fields of propaganda.

I will now run through the various

propaganda methods again and set down my estimates of the minimum sums necessary to achieve smoke abolition in, say, the next twenty years.

Advertising. I think we must forget all forms of advertising. Unless it is carried out continuously and on a large scale, money spent on advertising is mainly wasted, and continuous large scale advertising is quite beyond the Society's means.

Publications. The Society is already producing "Smokeless Air," an admirable quarterly, whose circulation should be increased in size and frequency of issue as soon as possible. We also have Mr. Marsh's excellent book "Smoke." I feel that we ought to extend our range of publications, to include leaflets, pamphlets, and papers, up to an expenditure of £5,000 a year.

Press. The press is likely to be our most fruitful field, and I consider that we should build up our press department as rapidly as possible to a limit of £5,000 a year.

B.B.C. The press department will be able to keep in constant touch with the B.B.C., supplying news items and scripts. No extra cost is involved.

Platform Publicity. As the Society has enthusiastic members all over the country, we should be able to rely on voluntary efforts for speeches and lectures. Conferences must be made self-supporting.

News Reels. Here again the press department will make arrangements for suitable inclusions, without cost to the Society.

Films and Film Strips. The production and distribution of films is quite beyond the Society's means. Film strips and recorded talks, however, are much less expensive, and, in view of the importance of pressing home our story in schools and colleges, I feel that we ought to spend £2,000 a year on them.

Photographs. We must depend mainly for the time being on voluntary efforts, supplemented by a few purchased from the agencies, spending, say, £100 a year.

Exhibitions. We cannot afford to take space in the main national and

provincial exhibitions, or to equip and run the expensive travelling exhibitions. Our efforts must be confined to displays.

Displays. We can obtain valuable publicity by supplying attractive and colourful display units, models, posters, wall sheets, diagrams, etc., for use in local exhibitions, civic weeks, festivals, and similar functions. As these suffer badly during transport, it will be advisable to have provincial storage centres. I recommend an annual expenditure of £4,000 under this heading.

Information. It is most important that we should run an efficient and well equipped information bureau, able to supply literature, photographs, statistics and technical data to all enquirers. It would be difficult to do this for less

than £2,500 a year.

Contacts. Personal contacts at high level are likely to be of growing importance in the future, and I consider £1,000 a year would be well spent on this activity.

Opinion Research. We must be content with the findings of our own members for the time being.

Recommended Annual Expenditure

The total of these recommendations is £19,600, or, say, £20,000 a year. Such expenditure on propaganda, while it would not achieve spectacular results in a short period, should nevertheless go a long way towards achieving the abolition of smoke within the lifetime of many of us.

Discussion on Mr. Hardern's Paper

John Roberts (Cheltenham) took the opportunity to pay tribute to the excellent work done by the N.S.A.S. Of all the organizations with which he had been associated over a long period of years, he knew of none that could be recommended to spend its resources so wisely and to such good purpose as the N.S.A.S.

He recommended that the Council should prepare a case to put up to the Ministry of Health in support of a grant to continue the good work.

W. Beaumont (Chief Sanitary Inspector, Coventry) referring to the total costs of £500,000 a year being the estimated amount necessary for putting into effect all the methods of education and research suggested by the author, asked "where is the money to come from?"

He maintained that the question of atmospheric pollution was a national problem and therefore greater financial support should be given by the Government to the Society and also to local authorities. That the Society should be appointed as a "Board of Control" vested with powers to advise and if necessary, to direct local authorities upon the question of atmospheric

pollution. Only in this way would it be possible to secure uniformity and concerted action. Local authorities should be reimbursed to the extent of 50 per cent. of the cost of carrying out the work under the direction of the controlling body. He said that in his opinion the existing machinery for dealing with the problem of atmospheric pollution was most inadequate and inefficient. The work required accelerating by means of increased financial backing and greater control.

F. V. A. Smith (Chief Sanitary Inspector, Burton-on-Trent) said that his Authority were shortly holding a municipal exhibition and in his search for exhibits he was very surprised to find how few illustrations were available in connection with the work of atmospheric pollution.

He suggested that the Society appoint a panel of experts to consider the possibility of producing suitable photographs, films and film strip to help make the public smoke-conscious.

Alderman W. K. Heaton (Bury) congratulated the author on the amount of detail contained in the paper, but could not agree with the recommendation to spend £20,000 annually for a

period of ten years. He pointed out that while there were about 1,500 authorities in the country, only about 400 were affiliated to the Society. So far as Bury was concerned he could not pledge his Authority to such a scheme. Alderman Heaton drew attention to the fact that it had been stated earlier in the Conference that probably there would be a financial grant from the Ministry of Fuel and Power, but he noticed that when the Minister of that Department addressed the Conference the previous day he had made no reference to such a grant. Personally he was not surprised at this omission, as in his opinion no Government Department would subscribe to such an amount as had been mentioned without having control of the spending of any grants made.

Alderman Heaton went on to say that he felt this question was one for the Minister of Health who should give Local Authorities powers to deal with the problem. His Authority had applied to the Ministry for such powers in byelaws some months ago and the Ministry did not grant the making of the Byelaw required, to deal with the problem. Surely with the putting into operation of the National Health Act, the first essential to good health was a clean and unpolluted atmosphere, and unless Local Authorities had the powers in this direction, then the population was not likely to reap the full benefits of such an Act.

Arnold Marsh (General Secretary) said that he welcomed Mr. Hardern's paper very much indeed. He had now been for many years engaged in the task of trying to secure for the Society the

maximum of publicity that was possible with the extremely small resources available, and he was grateful for the most convincing way Mr. Hardern had stressed the need for the planned selection of activities. Concentration of attack on the most favourable targets was essential, and the danger always to be guarded against was that of dispersing one's offensive power over so wide a front that it was everywhere weak and ineffective.

A scientific approach to the problem of propaganda with limited means was necessary: that meant experimenting and carefully observing the results of the experiments, and in fact of all their propaganda work, so that effort could be directed more and more on the projects that gave the best returns with the least outlay of money and time.

Replying to the criticism of Mr. Smith of Burton-on-Trent about the small amount of photographic and exhibition material available, Mr. Marsh said that exhibits were being built up as quickly as the time that could be allocated to this work would allow, and that many new photographs were becoming available as the result of an appeal by the Society published in the photographic press during the summer. A great deal of correspondence and other work was involved in such schemes, and had to be subordinated to conference and other urgent business. Requests for the loan of exhibition material were continually being received from local authorities and others, and it was unfortunate that so many came at the same time.

SMOKE PREVENTION IN RELATION TO TOWN PLANNING

by J. NELSON MEREDITH, F.R.I.B.A.,

City Architect, Bristol

"A spotless town is a more moral town than an air-polluted town. It is hard to have clean children in a dirty town, and physical dirt is closely related to moral dirt, and both lead to degeneracy. It is too much to expect good results in schools that exist in an air-polluted atmosphere. We cannot imbue the young with a sense of beauty when beauty itself is bedaubed."

—*Dr. Evans, Chicago.*

IN this paper I speak solely as an Architect, and I make it plain at the outset that I do not in any way profess to be able to express an opinion from a medical or health point of view, except to say that it is manifest to everyone that smoke cannot be anything but injurious to health, this being borne out by the fact that deaths from pulmonary complaints and the Infant Death Rate are much higher in built-up Industrial Areas than in the Country Areas.

An important point to remember is that each year three million tons of solid matter are thrown into the air together with about five million tons of sulphur dioxide (which is equivalent to about eight million tons of sulphuric acid) from the industrial and domestic chimneys in this country, and further, some thirty odd years ago, it was calculated that six million tons worth of fuel was wasted in England on the production of useless smoke. This was a mere waste of coal and in addition, we must allow for the cost of extra washing which smoke causes in every household, the damage to agriculture, buildings, and last but by no means least, health. Obviously a smoky town cannot be a clean town and when we realize that over every square mile of our industrial towns anything from 200 to 500 tons of smoke dirt falls each year with various corrosive acids and vapours in addition, it is obvious that unless action is taken to prevent

this menace, all our Planning Schemes will be to a great extent in vain.

Breathing being a continuous process, it is well to remember that the body takes in about 3,000 gallons or 35 lbs. of air each day, seven times the average amount of food and drink.

No doubt you will expect me as an Architect to be expressly concerned about the disastrous effect of smoke upon buildings; and as buildings will form the major part of our Town Planning Schemes it is from this aspect I offer my comments.

Coal, I believe, has been in use since about 1500 B.C. and for some seven hundred years complaints have been put forward. In the 13th century we are told that Queen Eleanor when staying at Nottingham was unable to remain in the city owing to the smoke nuisance and moved to Tutbury, and at the end of this same century, certain important people complained of smoke in the London area.

In the 16th century, Queen Elizabeth complained of smoke in the Westminster area with a result that certain industrial concerns turned over to wood. Later we hear of complaints by Charles II and we read that in the 17th century John Evelyn wrote, referring to London—"That this glorious and ancient city should so wrap her stately head in clouds of smoke and sulphur so full of stink

and darkness, I deplore with just indignation."

Sunlight, as we all know, aids the general resistance to disease and is one of the essentials of animal and vegetable life—obstruct it by smoke and the result is obvious.

Let us not forget these points and endeavour to realize the vital task which lies before us.

The Need for Vision

Town Planning cannot possibly be carried out without *vision*, and when we plan either the most meagre dwelling or a Civic Centre, we visualize the final achievement and suggest various materials accordingly. In other words, we visualize the finished product. Yet in how many of our building works of the past has this been materialized? Look at the Town Halls in Manchester and Birkenhead, once cheerful and bright buildings, now covered in a shroud. Surely when the Architects designed these they did not anticipate these black masses? Look at St. George's Hall in Liverpool, once a beautiful light brown colour, now a dark mass having lost practically all resemblance of the beauty of Darly Dale Stone. Would Elms and Cockerell now find it difficult to recognize their great conception? I believe they would.

Fortunately under the 1947 Town and Country Planning Act, Local Authorities have executive powers by means of which conditions can be attached to their consent to proposed industrial and other building development of the land specified in the Act. They can when dealing with proposed developments that include fuel burning installations require the use of methods which are as smokeless as practicable and can attach suitable conditions for this purpose to their consent.

Incidentally, I trust that other Local Authorities will follow the examples set by the City of London and Manchester Corporation, who, in their lease agreements for industrial areas have excellent clauses as to the construction of furnaces and alterations to furnace equipment, etc.

In the Housing Manual, 1944, the Ministry of Health state:—"The Government and the Industries concerned are alive to the need for developing domestic fuel appliances and installations designed to give greater efficiency and reduce the emission of smoke. Recently both together and separately they have sponsored an increasing volume of research towards this end. There is now a widespread demand that the evil of atmospheric pollution shall be resolutely attacked, one of its principal causes being the inefficient combustion of raw bituminous coal in the home. The Government attach particular importance to smoke abatement in view of the injuries to health and to general amenity caused by atmospheric pollution. The extra labour of the housewife is another evil result which must not be overlooked."

In our post-war Reconstruction Schemes a series of opportunities will occur for making the "resolute attack" recommended both over the whole field of Industry and to a very large extent in Housing. Measures can be taken to ensure that new fuel burning installations for industry and commercial heating are both efficient for their purpose and such as can be operated with maximum smokelessness. Complete freedom from smoke emission in new houses may not be immediately possible but the Housing Manual recommends that open fires installed should be suitable for burning smokeless fuel as well as bituminous coal. Steps have already been taken in Bristol to this end.

Any town could and should be a pleasant place in which to live, yet few of our towns ever approach those standards of amenity that makes people consciously regard them as pleasant places in which it is a privilege to work and live. It appears that many are simply places to work in and then to escape from.

We grumble about the vast sprawl that has taken place in our large towns but can we wonder at this when we realize that the simple needs of our people, i.e., healthy air and sunshine for the children, clean surroundings to

give a clean home and less household labour, a garden where the grass is green and flowers will flourish, are non-existent?

I firmly believe that the æsthetic sense of the town dweller has been blunted by his environment or has perhaps never been given the opportunity to develop. Drab surroundings, dimmed sunshine, the shroud of dirt over everything, the loss of colour, all these mean lower standards and weakness of effort that is needed to remove them. Small wonder that we see cheap and tawdry substitutes for the beautiful.

To combat this great enemy, Smoke, I believe we should begin with the young people in our schools. Young minds are very receptive and if those responsible for the education of our children endeavour to instil into these young minds what harm can be done by smoke and what really does make a city or town a pleasant place in which to live and work, I feel we could look forward to a happier and healthier existence.

Incidentally, we must not forget that in a smoke laden atmosphere, the health of children is particularly affected. The ceaseless fall of smoke dirt degrades environment, robs our towns of much of the amenities they might enjoy and is one of the principal causes of Urban squalor. Reconstruction and Town Planning measures that fail to take this factor into account can never fully achieve their goal. Smoke dirt corrodes, soils or destroys stonework, fabrics, metal and paint. Everywhere money and labour is diverted from productive tasks to repair or prevent the ravages of smoke, and I understand that over the year, wastage is measured in millions of pounds.

Plant life suffers as does human life. In many areas beauty and solace of flowers and greenery is next to impossible or is won only by costly effort.

I have mentioned earlier John Evelyn and from his day in the reign of Charles II to the present day people have been trying to solve this problem. I feel, however, that the attempts made have failed because of the over-riding need

to burn coal without regard to the consequences. Nevertheless, in the last two generations much has been done and here I pay tribute to the National Smoke Abatement Society. It is, I feel, the bounden duty of us all to do everything we possibly can to support the Society in their great work.

Smoke is formed by the imperfect combustion of raw bituminous coal. It can be prevented either by burning raw coal only under such control and in such suitable appliances that by ensuring perfect combustion no smoke is formed, or by first pre-treating the coal to give fuels that are smokeless under all conditions and utilize the smoke-producing constituents as materials (and they are very valuable materials) for productive purposes.

Smoke prevention is one important reason for securing a better and more scientific utilization of our coal reserves.

Central Areas

In our reconstruction schemes, central areas will in the main be the first to be dealt with. Therefore, the first part of any town or city to be made a smokeless zone will normally be the central area. These are particularly suitable for a number of reasons. They consist mainly of business and administrative premises, shops, theatres, etc., all of which from the nature of their heating requirements can be made smokeless with little difficulty and economically. The central area is, or at any rate should be, the most important part of any town. A city or town is judged by its own citizens and by its visitors by the standard revealed at the centre; in short, it is the heart of the city or town. Therefore, the new buildings to be erected in the central areas should be smokeless themselves and should not be forced to suffer rapid degradation by blackening and corrosion because of smoke emitting neighbours. Manifestly it is bad planning to strive for beauty and amenity in the centre of our towns without at the same time doing our best to give the reconstructed areas an atmosphere in which it is possible for these beauties and amenities to be

retained, mellowed and enhanced rather than degraded by the advancing years.

Central areas should contain, and more are more likely to contain, parks, gardens, and tree-lined streets or boulevards. Here again a smokeless atmosphere is necessary if grass, trees and shrubs are to thrive and if they are to give pleasure rather than by their dinginess depress us.

Colour and brightness are needed if the centre is to be a place of charm and achieve dignity with gaiety.

The District Heating Scheme prepared by Messrs. Arthur Scull & Son Ltd., a Bristol firm of engineers, for the central portion of the city, is certainly a means of achieving a Smokeless Zone.

The Disfigurement of Stone

The most obvious and familiar effect of smoke on buildings, stone and brick (and I would add, statues), is the disfigurement due to the blackening of the surface and the encrustations of sooty matter that frequently obliterate essential lines and decorations. Such disfigurement does not in itself injure the stone and does not cause material loss. It does, however, seriously reduce the æsthetic and decorative value of a building and from that point of view, soot and tar may be said to have a destructive effect.

The material effect is caused by the corrosive action of the sulphuric acid contained in the deposit, and that brought into contact by air, rainwater or condensed moisture is the most serious economic factor.

Here I must emphasize the fact that atmospheric pollution is by no means the only cause of decay; as a matter of fact it has too often been blamed for decay that can be traced to some quite different cause. A very common cause is contamination of the stone by soluble salts other than those produced by chemical reaction with atmospheric gases. The cause can, however, be largely avoided in new buildings by the exercise of suitable precautions by the quarry owner, the builder and the architect. Occasionally, though rarely, and then generally by mischance, the

salts are present in the stone before it is placed in position. Usually, however, they are absorbed from an external source, from the soil or from neighbouring materials in the building such as mortar or brick and concrete backing or they may be the result of the mistaken use of water soluble materials for purposes of cleaning and preserving. Nevertheless, chemical analysis will reveal what salts are present and suitable investigation will often give some indication of their origin. As a rough guide for distinguishing between effects of atmospheric pollution and those to salts contamination from some other source, it may be stated that except with magnesian limestone, the appearance of efflorescent salts on the surface of the stone indicates that the decay is to be attributed to some cause other than or in addition to atmospheric pollution.

Decay of Limestone

Incidentally, limestones are the ones principally affected. These stones, of which the principal constituent is calcium carbonate, reacts with sulphuric acid to form calcium sulphate. Erosion is assisted by the fact that calcium sulphate occupies a larger volume than the carbonate from which it is formed and is rather more soluble in water than the carbonate. One of the effects of the reaction is the formation of a hard impermeable skin on the surface of the stone which tends to blister. An ugly form of decay is thus set up. The formation of the sulphate skin is inhibited in exposed positions where the surface is frequently washed by rainwater. In sheltered parts the surface gradually blackens and thus is developed the familiar black and white effect seen in so many of the Portland stone buildings in our cities to-day.

There is some difference of opinion as to the æsthetic effect of soot on limestone buildings. Only recently when discussing with an architect friend some buildings in Bath, he was very definitely of the opinion that these buildings would be by no means enhanced were the discolouration removed. Present day conditions are such that it is unusual to see in this

country any but the newest town buildings in a clean condition, so that soot has come to be regarded as artistically desirable, but it cannot be denied that its effects are often unpleasant and on architectural sculpture often ludicrous. From the technical point of view, soot deposition is harmful rather than protective and for this reason, if for no other, is undesirable.

Slate

Slate is another building material which is attacked by atmospheric gases, and as Sir Frank Baines has said, "Even the Westmorland slates which used to be regarded by architects as the best for roofing, and as an almost permanent material, have been so attacked by atmospheric pollution that the finger can be driven clean through them without any material resistance." Decay usually manifests itself on the underside, especially between the laps where water is held in contact with the slate by capillary attraction.

Sandstones are not so readily affected except when they contain a calcite cementing material. This reacts with sulphuric acid with the result that silica sand grains become loose and the stone breaks down and disintegrates.

Reconstructed stone which is usually manufactured from crushed natural stone and Portland cement, behaves in much the same way as natural stone. Surface erosion and skin formation occurs. In general the material has not yet been used sufficiently long for the more spectacular effects of atmospheric pollution to show themselves, although instances are known where flaking is occurring in much the same manner as with natural limestone.

Mortar may be severely affected, largely because of its porous structure and the fact that it is undergoing chemical changes for a considerable time after it has been placed in a wall.

Brick is to some extent attacked and particular decay has been noted where it has been used in conjunction with limestone. The sulphates from the decay of the latter have penetrated the surface of the brick and by crystallization and expansion have loosened

the surface. Except where this absorption and penetration takes place, no other deleterious effects are attributable to atmospheric pollution.

The Houses of Parliament

A noteworthy case of decay to stonework due to defect in the original rock is that to the Houses of Parliament. The building was begun in 1840 and completed in 1852. Evidence of decay was apparent before the building was completed and by 1861 an Expert Committee was appointed to examine the problem and to suggest the best means of preserving the stone. Since then decay has continued and extensive repairs and replacements have had to be undertaken, costing several hundred thousand pounds. The primary causes of the decay were the use of a magnesian limestone, unsuitable for the decorations it had to carry and *faulty bedding* of some of the stone. Furthermore, another cause of the trouble was the use of iron dowels and tie rods which naturally rusted. Obviously these should never have been used.

I myself have experienced trouble due to faulty bedding of stone and here I should like to stress the extreme importance of the laying of masonry on its natural bed.

Incidentally, in a recent case in Bristol where I was anxious to preserve the façade of a building of historical and architectural interest, I found on inspection that in addition to decay caused by atmospheric pollution, a large number of stones were fractured due to the use of iron cramps, with the result that preservation was impracticable.

With regard to remedies, I must emphasize that until pollution of the atmosphere by smoke and acid gasses is regarded in the same light as pollution of water supplies and treated accordingly, disfiguration and decay of building stone due to this cause will necessarily continue. Suitable choice and use of material is to a certain extent a safeguard against decay but is of course little safeguard against discolouration by soot. Indeed those building stones that suffer most seriously

in this respect are amongst the most durable. Surface treatments designed to confer weather resistance are seldom helpful. In special circumstances where the treated stone can be kept under observation and where the treatment can be renewed from time to time as may be necessary, a suitable selected stone preservative can occasionally find useful application. General and indiscriminate use is not to be recommended. I admit that oil paint applied when the stone is dry and renewed every few years has good protective qualities, but I have seen many excellent examples of stonework and stone carving spoiled by the use of oil paint. Paint is of course not suitable for the treatment of buildings of historic and archaeological importance. Limestone buildings can be maintained in a clean condition by hosing them down with water at intervals.

The inhibition of skin formation and the removal of decomposition products should also enhance durability. The Goldsmiths' Hall in London has for a long period been washed in this way twice a year, with excellent results and certain other buildings are now being maintained in the same way. Whether this method would be equally effective if applied to sandstone buildings is doubtful. Some types of sandstone may benefit more than others.

To regain a good appearance in old buildings that have been allowed to become very dirty, more elaborate methods are needed. Only water or steam should be used. Chemical cleaning agents which are liable to leave soluble salts in the pores and to cause subsequent decay should always be avoided, however attractive they may appear to be either in effectiveness or in relative cost.

It is, of course, manifest that purification of the air would contribute to improve the appearance of buildings

and to extend the useful life of the materials employed in their construction.

Prevention however is better than cure so let us all strive for clean air to which smoke is the enemy.

I therefore recommend the installation of District and Block Heating Schemes, and in the hope that gas and electricity might possibly be distributed at a cheaper rate, more use be made of these in industrial, commercial and domestic heating (and I would add railway engines under electricity), open fires suitable for burning smokeless fuel, new fuel burning installations both efficient and such as can be operated with maximum smokelessness, and, this is important, to do all within human power to arouse the interest of the general public. Here I feel sure the Press and the B.B.C. could be most valuable agents and would it not be beneficial if the post offices franked all letter stamps with the slogan "Unholy Smoke"?

Town Planning affects every individual in the country, so it behoves everyone to strive for the prevention of smoke.

Let it be said by those who will come after us—they did a magnificent job when they used their common sense and took action to control smoke.

In conclusion, I offer my grateful acknowledgements to:

The National Smoke Abatement Society for the valuable literature it has prepared and distributed; Mr. Arnold Marsh, its General Secretary and Editor, whose book "Smoke: The Problems of Coal and the Atmosphere" is a veritable mine of information, and Mr. R. J. Schaffer (Building Research Station) whose report on Atmospheric Pollution in its bearing on the weathering of stone and similar building materials is most enlightening.

Discussion on Mr. Meredith's Paper

Alderman J. J. Milton (Chairman, Bristol Health Committee) said that he had come to take part in the discussion to endeavour to get the Conference to take a more optimistic view of the Society's work. Some said they had no smoke problem; others asked the Society's help because they had apparently achieved little.

In the first place they all had the smoke problem. It was a national problem and affected them all because it was a health matter and smoke had no barriers or boundaries. Secondly, in re-planning house erection, alteration of industrial power plant, or in fuel saving, all the interested sections were seeking advice and installing plant or equipment that would abate smoke and reduce fuel consumption.

The Society had achieved much and had built better than many seemed to think or know, and evidence was shown by the speaker, who was an architect of some repute, coming to take part in the conference. He congratulated him on his Paper and trusted that Conference would take a more optimistic and positive view and go forward to achieve much more.

Sir George Elliston (Past President) said he had hoped to hear more from Mr. Meredith about the development of district heating schemes. The present was a unique opportunity to adopt such schemes, especially when rebuilding the business quarters of large cities now in a state of devastation. The opportunity was equally tempting in connection with the development of housing estates, and it was disappointing that so many local authorities were "missing the bus." Surely district heating should be a central feature in any proposals for the betterment of housing conditions. Something like a revolution was being achieved in raising the standard of living for the working classes, and the comfort of

their homes would be enormously enhanced if heating was supplied from district stations. By that means every room in their houses would become a sitting room. The young people now prolonging their school days would be able to do their home work away from the wireless and other distractions of family life, and it would no longer be necessary for the old folks to go to the "pictures" when they wanted to keep warm. Sir George added that he hoped the councillors and officials attending that conference would keep the subject of district heating before their councils on every appropriate occasion.

W. L. Mather said that members of the Conference were probably able to do more through their membership of the Smoke Abatement Society to the general good of the country than by any other means, since by the removal of atmospheric pollution they would improve health and amenities for the whole nation. He felt that in addition to the public efforts which the delegates were making, that each one in his or her individual capacity should try, before the next Conference, to make some positive contribution to smoke reduction. He suggested that as a target each member present should aim at reducing the smoke from at least one chimney during the forthcoming twelve months.

G. H. Wilkinson (Sanitary Inspector, Corby U.D.C.) asked whether only a few architects were interested in this subject; and whether the subject was included in the syllabus for architectural students.

He instanced Corby, a town commenced only in 1933. The layout of the estates (built by the steel firm) with variation in houses, its avenues, groves and closes, showed that the architect employed was an expert. But the town had been built on the windward side of

the works ; and what was more serious—the boundary of one estate was within 80 yards of a batch of blast furnaces !

Councillor J. S. Tennant (Chairman, Health Committee, Harrogate) said that as half the problem was caused by domestic smoke, he felt that propaganda should be used in advising on economical firing of open fires. Also in the old type of houses, the provision of modern grates which give a better combustion of coal ; and landlords should be allowed to count such installations as structural improvements.

He urged delegates from the so-called “ smoke free ” areas to go back to their Councils and report that scientific investigation showed that the evils of smoke deposits were carried in varying degree over the whole country, and it was in the national interest to take united action to overcome the smoke menace.

A. E. Snodgrass (Chief Sanitary Inspector, Bury) asked if the promoters of private Acts which contained provisions relative to the establishment of smokeless zones had fully considered the significance of the words “ so far as practicable ” in relation to the installation of furnaces capable of being operated without emitting smoke. He enumerated some of the practical difficulties in dealing with the emission of smoke from chimneys under Section 101 of the Public Health Act, 1936, which contained a similar saving clause. He also asked how local authorities taking legal proceedings in respect of a smoke nuisance from a plant which had received “ prior approval,” proposed to deal with the defence that the plant had been approved by the local authority, assuming such nuisance did not arise from inferior fuel, bad firing or obvious mechanical defect.

Dr. C. F. White (Medical Officer of Health, City of London) said that, in listening to Mr. Hardern’s paper on Education and Propaganda followed by Mr. Meredith’s paper on Smoke Prevention in Relation to Town Planning, it had occurred to him that there should be some means by which the members of the staffs of local authorities and also the general public should be

able to see the whole picture of smoke abatement as well as of other local government problems in their particular areas. So far as he was aware the Medical Officer of Health was the only officer who had to submit an annual report to his Authority, copies of which had to be sent to the Ministry of Health, and were also available to the press. He had noticed that for the first time this year the annual report of the Ministry of Health and the annual report of the Chief Medical Officer had been printed in one blue book. Would it not be a good idea if every local authority had to issue an annual report which would comprise sections by the officers in charge of all the various departments ? It would be important that each should write a brief critical survey of the work of his department during the year ; statistical tables being printed as appendices. In his experience very few people read statistical tables, but they would read written reports provided they were not too technical. Annual reports of the work of local authorities on these lines would correlate the work of the various departments and would be a valuable and inexpensive means of education and propaganda. The local press would certainly make a feature of extracts from the report and the technical press would give wide publicity to points of special interest.

John Roberts (Cheltenham) said that it appeared to him that during much of the work of the Conference, we were preaching to the converted. He suggested that at future Conferences other institutions, such as the Iron and Steel Institute, the Institution of Mining and Metallurgy, and the Coke Oven Managers’ Association should be officially invited to attend. Both sides should benefit from the free exchange of views.

Referring to a previous speaker’s remarks on Nottingham, he said that Mr. Meredith’s reference to Queen Eleanor was a well-known historical fact. (It occurred in the year 1257, when Henry III invaded Wales, and left his wife at Nottingham).

Charles Gandy (Chairman of Execu-

tive Council) reminded the Conference that the town planning of a city now dealt with the city as a whole, and that in nearly every case the plans which had been prepared in recent years assumed that by the time the plan took full effect the whole city would be a smokeless one. In the meantime, unfortunately, it must be regarded as certain that there would be large residential areas which would not benefit by the installation of the new appliances in housing estates, and where houses especially in poorer quarters often covering many hundred acres of land were still equipped with old-fashioned grates. These, besides being extremely wasteful of fuel, were the chief source of domestic smoke pollution, so degrading to the health, happiness and amenity of the neighbourhoods in which it was produced. He asked that every delegate and member of the Society should do whatever he or she could to ensure that this aspect of the problem was fully considered, and if possible some solution found for it.

F. J. Forty (City Engineer, City of London) in a written contribution said that at this meeting to discuss ways and means to further a cause which all delegates had at heart, and in the midst of speeches of familiar type—the question presented itself—had any practical progress really been made since they met in a state of similar enthusiasm last year? Are they in their respective spheres able to report some real advance towards the desired end by their own local authority?

One delegate that morning had suggested that there was a waning of enthusiasm and active disposition on the part of the delegates in the Conference proceedings that week. The time available for discussion did not allow for any extensive comment, but reflection upon what this member said caused him to feel that something more than the district Progress Reports already presented to the Conference might be helpful.

He served the Corporation of the City of London, a Local Authority from whose ranks came the Society's

President for the past two years, Sir George Elliston, whose enthusiasm in the case of smoke abatement is so well known as not to require emphasis, and whose Medical Officer of Health, Dr. C. F. White, ever-active in the cause of smoke abatement, had addressed them that day.

The contribution of the Corporation to the cause of smoke abatement had been positive and continuous. In the City of London Various Powers Act, 1946, power to make bye-laws was secured, and drafts of those bye-laws had been submitted to the Ministry of Health with all possible representation, to ensure that they would soon be operative. Primarily, the purpose of the bye-laws was to ensure that the heating arrangements in new buildings and in substantially altered buildings, required the prior approval of the Corporation; the Corporation in considering applications would have to be satisfied that the proposed heating arrangements were calculated to prevent or reduce to a minimum the emission of visible smoke. It should be noted, however, that the Corporation of London had not simply rested content with making bye-laws to be complied with by others; it was taking active steps to deal with certain of its own property.

In the artisan's dwellings of the Corporation, erected towards the end of the last century, the domestic stoves of an old fashioned type were to be replaced by appliances of the latest type fully in compliance with the projected bye-laws, and suitable to burn smokeless fuel when this became available.

What else had the City of London done? The answer to that might readily be given by a reference to the investigation into the possibility of the application of district heating to the City of London. The Corporation ordered, and had received, a report from its engineering consultant, Mr. S. B. Donkin, upon the possibilities of that exceedingly important matter. No final decision upon that report had yet been taken, because since it was made there had been certain events to take into consideration, but as soon as the Corporation were in a position to

do so, they would, in conjunction with the Town Planning Authority, which, under the new Act of Parliament, 1947, was the London County Council, arrive at a decision on the scheme, which, needless to say, was of a very considerable magnitude. It was not for him, at the present time, to attempt to forecast what this decision would be, but it was, he thought, sufficient for the

present purposes, to show how deeply these matters were being gone into with a view to making every possible contribution to improve the amenities of those parts of London for which the Corporation were responsible. It would probably be realized that the ancient City of London was well to the fore in an examination of modern problems.

THE BRAINS TRUST

THE final session of the Conference took the form of a Brains Trust on "Smoke Prevention and Clean Air," to which the public was invited. The report that follows includes all the questions asked and the main points of the replies.

Mr. Stewart Swift (Chief Sanitary Inspector, Oxford), Question Master, opened the proceedings by welcoming the visitors and the parties from colleges and schools who were present. He then introduced the members of the Trust, as follows :

Mrs. Helen Brown, of Oxford, who was a representative on the Society's Council of the Women's Advisory Council for Solid Fuel and an expert on the use of fuel and fuel-burning equipment in the home.

Mr. S. N. Duguid, who was well-known as a fuel technologist, lecturer, organizer of lectures, and active in many other ways on the industrial side of the problem. He had been of great help to the Ministry of Fuel and Power in its educational work and was a member of the Society's Council and Technical Committee.

Dr. Perry, deputy Medical Officer of Health for Cheltenham, who they were very glad to have with them, and who had most kindly agreed at short notice to take the place of Dr. Morley, the Medical Officer of Health, whose absence through illness was greatly regretted.

Mr. F. J. Redstone, the Chief Sanitary Inspector for Bristol and Honorary Secretary of the Bristol and

District Regional Smoke Abatement Committee. Mr. Redstone, who was Chairman of the Society's Publicity Committee, hardly needed an introduction at a Conference of the Society.

Mr. John Roberts, who was a leading authority on coal and its carbonization, and who was fortunate enough to live in Cheltenham, where he was associated with the Severn Valley Gas Corporation.

Mr. R. W. Steel, who had been closely associated with the Electricity Undertaking in Cheltenham, and who was now Commercial Manager to the South-Eastern Electricity Board.

Mr. Swift thought they had assembled an extremely well-informed team, who between them so well covered the many aspects of the smoke problem that they should have little difficulty in answering any of the questions. He then read the first question.

Does the Brains Trust think that more frequent prosecutions under the Public Health Acts would cause manufacturers to sit up and do more than they are doing to prevent smoke—or do they think a better policy is persuasion and advice?

Mr. Redstone considered that it was not advisable to institute too many prosecutions because manufacturers were doing their best with obsolete plant and poor quality fuel. More could be done with the kid glove than the crowbar and it was better to go along to the works to discuss it with the managements and other experts without taking it before the magistrate.

Would the Brains Trust explain the

difference between smoke from factory chimneys and that from domestic grates?

Mr. Duguid said that the main difference was that the smoke from domestic chimneys was more harmful.

Mr. Steel added that as the smoke from domestic chimneys came from so many different points, little could be done, but that steps could be taken to deal with the smoke and grit from factory chimneys.

Dr. Perry said that cancer was worse in smoky areas than in clear areas, and it was possible that cancer of the lungs was caused by the tarry matter in domestic smoke.

Mr. Roberts concluded by saying that the domestic fire burns at a lower temperature for a longer period and therefore produced more smoke, whereas furnace coal was brought to a high temperature more rapidly and with a consequent smaller production of tar.

Although more attention is being paid to the installation of improved domestic grates, is the Brains Trust of the opinion that sufficient attention is being paid to the provision of adequate storage facilities for smokeless fuels?

Mrs. Brown was of the opinion that insufficient space was provided for fuel storage. As it was hoped that more appliances would be available for burning smokeless fuels and due to the fact that these were more bulky, more storage space should be made available, and she suggested that separate compartments should be fitted, preferably under cover, for smokeless and bituminous coal.

Mr. Redstone said that the accommodation provided should be at least three times the amount normally installed, and, if possible, a hopper provided instead of the present arrangement.

Mr. Roberts defined the various grades of domestic fuel, showing that smokeless fuels required more storage space than smoky coal.

Mr. Duguid added that his main trouble was to fill the limited space at his disposal.

Mr. Steel drew attention to the vice of continually using the poker, but agreed that more attention should be

given to the provision of adequate storage facilities.

Can the Brains Trust state whether heat rays given off from smokeless fuels burning in domestic grates are more beneficial than those from coal fires?

Dr. Perry did not think that any distinction could be made between the two. Both gave off radiant heat, but he did not think that they gave off ultra violet rays which were more important for the well-being of the human body.

If the state of the atmosphere in large cities is so deplorable, can the Brains Trust account for the wonderful display of flowers and shrubs in public parks and gardens?

Beautiful displays were maintained at terrific expense for replacements, said Mr. Redstone. In some areas the cost of replacement was small, but in industrial areas the cost was very great, and if the atmosphere was cleaner the flowers would be more beautiful still.

Colonel Cousin in his report yesterday said that poor quality fuel was a frequent excuse for smoke emission. Can the Brains Trust state what kind of plant or accessories are required to make it possible to burn poor coal without smoke?

Mr. Steel said that when coal was distilled there must be sufficient air and draught for the products of distillation to be properly burned. Suitable plant was available for use in factories and power stations, but it was very difficult to design such apparatus for use in limited space. Before the war poor quality coal could be successfully burnt, but to-day we had trouble because of poor quality and variation in quality.

Mr. Roberts said it was largely a question of the distribution of ash.

Poor quality coal, said Mr. Duguid, was too often made an excuse for carelessness and lack of maintenance. If you wanted to produce black smoke, bituminous coal could be made to make more smoke than a low grade fuel.

Mrs. Brown added that it was difficult to burn low grade coal on the domestic fire without smoke, but it was possible to reduce the smoke with modern appliances.

Mr. Duguid entered into the dis-

cussion again by saying that the dark coloured smoke frequently seen coming from a factory chimney was not smoke but grit due to the forced draught furnaces which were put in and used to the fullest extent. When the draught was not regulated, grit and dust from the coal was blown up the chimney and the smoke coloured by grit.

Mr. Redstone said that special apparatus would have to be used if plants were continually being supplied with low grade fuels, and he would like to have Mr. Duguid's opinion on specific plant.

Mr. Duguid replied that it was quite obvious that the furnace would have to be designed to suit the fuel, and added that it was an important feature to have adequate space between the bars in small furnaces. It was an overriding feature that there must be adequate draught. There were furnaces suitable for different types of fuel, but no equipment was available that was suitable for all. He quoted an instance of 173 varieties of coal being delivered to works, but the problem could be tackled and experiments were now being undertaken by firms making coking stokers.

Can children living in a smoky city, providing they have good nourishing food with sufficient vitamins, be as healthy as they would be if they lived in the country?

Dr. Perry said children could not be so healthy in smoky cities. They were more likely to suffer from skin diseases than children living in country areas. The excellent feeling experienced when waking up in the morning and seeing blue skies had its psychological effect which could not be obtained in a smoky area.

Mr. Roberts emphasized that air was more important than food, as we consumed far more air per day than we did food. It was possible to cut off the supply of food for 24 hours and feel better for it, but it was certainly not possible to live for 24 hours without air.

Mr. Redstone reminded the audience that in some industrial areas over 50 per cent. of the sunshine was kept from the inhabitants. He told the story of

the man who died when he arrived home from his annual holiday. A neighbour viewing the body said how brown he was, to which the widow answered that the holiday did him a lot of good.

In the interest of coal conservation, would it not be better to restrict the use of electricity to lighting power and traction—especially for the electrification of the railways—and to prohibit it for space heating, which could be left to gas, solid smokeless fuel and district heating?

Mr. Steel said no. He said the best way to deal with poor fuel was to use it in power stations and generate electricity.

Mr. Roberts said it required twice as much coal to generate electricity for a given amount of heat than if coal was carbonised to produce gas and coke.

Mrs. Brown remarked that it would be some time before the generating stations would be ready to supply all needs, and, therefore, for the time being solid fuel was extremely useful in the home. Gas or electricity would be expensive to the housewife to supply background heating throughout the entire day. It would be more economical to use solid fuel.

Mr. Steel added that the main thing was to have a supply of heat as and when you required it, and electricity could do this.

Mr. Roberts reminded them that the gas industry and the electricity industry were both engaged on a common front against smoke, and it would be best if each concentrated in performing work they could do most efficiently. He did not think that space heating could be done more efficiently by electricity than by gas.

Mr. Redstone concluded by saying that what was really needed was a national fuel plan.

Is it not time that there was a better method of sweeping chimneys, which at present often causes much work for the housewife? Can the Brains Trust make any suggestions for improvement?

Mr. Roberts said he could not suggest new methods, but did suggest the use of smokeless fuels and thus eliminate soot and the need for a sweep. He had

used smokeless fuels for eight years and had had no chimney swept.

Mr. Steel added "Why not get rid of chimneys altogether?"

More people in towns use spectacles than in the country; is this anything to do with the smoky atmosphere?

Dr. Perry did not think this was the case, and it was probably due to the fact that people living in towns were engaged in closer work and for longer periods than people working in the open air.

Mr. Steel asked if it had any relation to the song "Smoke gets in your eyes."

Does the Brains Trust agree that the Victorian phrase "Smoke Abatement" is too timid and flabby for to-day, and, in the Society's name especially, should it not be replaced by "Smoke Abolition" or "Smoke Prevention"?

Mr. Roberts said he was in favour of retaining the word "Abatement" because he did not believe in extremes.

Mrs. Brown was in favour of retaining the word abatement because we could not hope to entirely prevent or abolish, but we could abate, smoke.

It all depended on what you mean by smoke, said Mr. Duguid, as to him smoke was everything that came out of a chimney. It included ash and grit, and therefore the only way to abolish smoke was to abolish fires altogether, and therefore the question was not capable of being answered.

Mr. Redstone thought that smoke prevention was better than abatement, as prevention was positive and abatement was negative.

Mr. Steel was in favour of modifying the word smoke and adding atmospheric pollution.

Dr. Perry said that he was in favour of the words smoke abolition, as we no longer permitted sewage contamination of water, so why permit smoke pollution of the air?

Can the Brains Trust say if there has been any real improvement in the state of the atmosphere during the last 25 years?

Mr. Roberts said "Yes, unquestionably," and Mr. Duguid agreed.

Dr. Perry also agreed, and it was supported by the fact that the incidence of respiratory diseases was lower due to

the improved condition of the atmosphere.

Mrs. Brown also said there had been an improvement, but if one compared Manchester and Swiss cities, it was obvious that we still had a long way to go.

Mr. Redstone was of the opinion that there was an improvement in some areas. But he thought that without proper measurement of smoke deposit in certain areas, he was uncertain as to whether there really had been any improvement.

Mr. Steel reminded them that more homes had been built, thus creating more smoke, and more industries were emitting invisible gases. It was more than ever necessary to take measurements wherever possible to see where there are improvements and where deterioration was taking place. Local Authorities should be encouraged to take more readings regarding the state of the atmosphere.

During the last war industrialists were encouraged to make more smoke, said Mr. Duguid, and he felt that a good deal of apathy had been left as a result of this order.

I live near a large hospital, the chimneys of which frequently pour out dense black smoke. I am told that the boiler plant is an old one and that no improvement can be expected until it can be replaced. Does the Brains Trust think this is a valid excuse?

Mr. Duguid did not think this was a valid reason. He said that if there was no overloading there was no reason why the plant should not be operated efficiently. He insisted that men looking after boiler plant should be properly trained and recognized. In order to raise their status it was necessary to have apprenticeship and periods of training. He emphasized that plant could not be run efficiently if the people were not trained properly.

Mr. Redstone recalled the number of times they were told that nothing could be done about it just now.

Mr. Duguid said that the idea that improvements would cost a lot of money was entirely wrong. In many cases it only entailed minor adjustments.

In view of the appeals going out to save

fuel, especially by home consumers, to keep industry going, how can we get the latest equipment in new houses and at the same time save fuel and avoid "shedding the load" during the peak hours?

Mr. Steel said that perhaps the two parts of the question need not be related. As far as the electrical industry was concerned, he said it was necessary to shed the load by not using electricity during the hours when the load was so great that it could not meet all demands.

Mrs. Brown mentioned the fact that modern appliances gave heat in the mornings, which made it unnecessary to switch on electric fires.

Mr. Roberts assumed that the use of modern heating equipment was more

efficient than the old, and therefore if modern equipment were installed we should save fuel and thereby reduce load shedding.

The Question Master, Mr. Stewart Swift, at the conclusion of the proceedings thanked, on behalf of the audience, all the members of the Brains Trust. He was quite sure that, to judge from the lively interest that had been evident throughout the whole of the session, the audience would agree with him in saying that the meeting, which was an entirely new innovation, had been a remarkable success. The questions had been good ones, and the answers both interesting and enlightening.

Resolutions

THE following resolutions were adopted by the Conference during the course of its discussions :

1. Solid Fuel Burning Installations in New Houses

That the Minister of Health and the Secretary of State for Scotland be requested to make a condition of qualification for their approval for new housing schemes, or for the issue of a licence in respect of houses built by private enterprise, that any solid fuel burning appliances proposed to be installed shall be on the Government list of approved or provisionally approved appliances.

2. Prohibition of Manufacture of Obsolete Appliances

The the Government be requested to implement as soon as practicable recommendation 2 (c) of the Domestic Fuel Policy report regarding the prohibition of the manufacture and sale of new appliances falling below approved standards.

3. Resolution to Local Authorities

That this Conference of the National Smoke Abatement Society :

- (a) extends its thanks and appreciation to all the many local authorities and their officials who have co-operated in the survey of atmospheric pollution conducted by the Society ;
- (b) expresses its hope that other local authorities will even now assist by completing the forms sent to them in February ;
- (c) urges local authorities to co-operate more fully with the Department of Scientific and Industrial Research in making systematic observations of deposited and suspended matter and of the sulphur content of the atmosphere in their areas, especially where projected development may lead to worsening of conditions ;
- (d) urges local authorities to impress on proprietors of fuel burning plant the desirability of encouraging firemen to attend courses and examinations in boiler house practice, both of which should include practical work, and their acknowledgment in pay and status of the qualification thus conferred on those passing the examination.

* The action requested was taken by the Ministry of Health, with respect to local authority houses, in their Circular to Housing Authorities, No. 170/48, dated November 11th, 1948.

4. Colliery Chimney Smoke

That this conference is deeply concerned at the quantity of black smoke emitted from colliery chimneys, and

requests the National Coal Board to take all necessary steps to effect a remedy.



RECENT N.S.A.S. PUBLICATIONS

(Prices in brackets include postage)

Proceedings of the Cheltenham Conference, 1948. A full record of the papers and discussion, including an Address by the Rt. Hon. Hugh Gaitskell, M.P., Minister of Fuel and Power. 3/6d. (3/8.)

Proceedings of the Edinburgh (1947) and Brighton (1946) Conferences are also still available. 4/6d. (4/8d.) and 2/- (2/2d.) respectively.

The Law of Smoke Nuisances, by W. R. Hornby Steer, M.A., LL.B., Standing Counsel to the Society. Revised edition, 1948. Fully covers the law as it applies to England and Wales and with a new chapter on the post-war legislation now being secured by some local authorities ("prior approval" and "smokeless zones," etc.). With tables of statutes and cases and the relevant sections of the Public Health and other Acts. Cloth, 5/- (5/3d.); paper-backed, 3/- (3/2d.)

Guilty Chimneys. An attractive new pamphlet which, by means of passages from scientific and official reports and the statements of experts, makes a very readable introduction to the problem of smoke and provides a most useful source of references and quotations for speakers, writers and teachers. With photographs and a four page inset of maps and pictorial diagrams in colour. 1/- (1/2d.)

Smoke : The Problem of Coal and the Atmosphere, by Arnold Marsh. (Published by Faber and Faber). In its first part, this new book brings together and discusses the data on which rest the case against smoke. The second part reviews what has been done, the present position, and the means for securing the progressive abolition of smoke. With full bibliography and references. 306 pages and 21 photographs. 21/- (21/6d.)

Obtainable from the Society or any Bookseller

*Write for complete Guide to Publications, Annual Report,
and information about membership.*

**NATIONAL SMOKE ABATEMENT SOCIETY,
Chandos House, Buckingham Gate, London, S.W.1**

ROYAL SANITARY INSTITUTE

LIBRARY REGULATIONS

1. Books may be borrowed by Fellows, Members and Associates personally or by a messenger producing a written order. The person to whom books are delivered shall sign a receipt for them in a book provided for that purpose.

2. Books may be sent through the post, or by some equivalent means of carriage, upon a written order. All charges of carriage to the Institute shall be defrayed by the borrower.

3. A borrower may not have more than three volumes in his possession at one time.

4. A borrower will be considered liable for the value of any book lost or damaged while on loan to him, and if it be a separate volume, for the value of the whole work rendered imperfect.

Marking or writing in the volumes is not permitted, and borrowers are requested to call attention to damage of this character.

5. Books may be retained for 28 days. Periodicals may be retained for 14 days. Applications for extension of the loan period must be made in writing before its expiry. No book may be kept longer than 3 months.

New books will not be lent until after the expiration of one month from the date of their having been received by the Institute. The current number of a periodical may not be borrowed.

6. Borrowers retaining books longer than the time specified, and neglecting to return them when demanded, forfeit the right to borrow books until the volume or volumes be returned, and for such further time as may be ordered.

Any borrower failing to comply with a request for the return of a book shall be considered liable for the cost of replacing the book, and the Council may, after giving due notice to him, order the book to be replaced at his expense.

No volume may be reissued to the same borrower until at least seven days have elapsed after its return, neither may it be transferred by one borrower to another.

7. Books may not be taken or sent out of the United Kingdom.

8. Volumes returned through the post must be securely packed in a box, or otherwise protected.

Parcels should be addressed :

THE ROYAL SANITARY INSTITUTE,
90, BUCKINGHAM PALACE ROAD,
LONDON, S.W.1.